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# The market for natural rubber with particular reference to the competitive status of synthetic rubber

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Tropical Products Institute Report

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# The market for natural rubber with particular reference to the competitive status of synthetic rubber

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**Tropical Products Institute** 56/62 Gray's Inn Road London WC1
Ministry of Overseas Development

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# Summary


## Introduction

Nearly all the natural rubber on the market is the product of the tree *Hevea brasiliensis* L. The rubber is obtained from the tree as a colloidal aqueous dispersion known as latex. A small proportion of the rubber produced is sold as concentrated latex; more usually the latex is coagulated and shipped as sheet rubber.

In recent years there have been several major developments in the production and presentation of natural rubber:

(a) Plantations have been replanted with high yielding trees on an increasing scale.
(b) Plant hormones have been applied to trees as yield stimulants.
(c) Processing methods have been developed which produce a 'crumb' rubber in solid bale form.

The new processing methods are particularly suited to production of the newly developed types of rubber; controlled viscosity (CV) rubber, low viscosity (LV) rubber and oil extended natural rubber (OENR). These methods are also suited in varying degrees to the processing of both good and scrap raw rubber.

The new types of rubber are packed in smaller bales than the old types and are graded by technical specification.

Synthetic rubbers may be classified as general purpose rubbers, of which the most common is styrene butadiene rubber, and special purpose rubbers.

The synthetic rubber which reproduces the properties and characteristics of natural rubber most closely is cis-polyisoprene, one of the class of synthetic rubbers known as stereoregular rubbers.

Synthetic and natural rubbers are known as elastomers.

## Production

The world acreage under rubber is increasing and total world production of natural rubber increased from 1,990,000 tons in 1960 to a preliminary figure of 2,500,000 tons in 1967. The main producers, in decreasing order of importance, are West Malaysia, Indonesia, Thailand and Ceylon.

Production of synthetic rubber has exceeded that of natural rubber since 1962. Known world production, excluding that of the USSR and mainland China, rose from 1,984,000 tons in 1960 to a preliminary figure of 4,310,000 tons in 1967. The main producers are the United States, the USSR, Japan, Canada, the United Kingdom and the member countries of the European Economic

Community (EEC). In recent years there has been a marked trend towards overproduction.

## Consumption

World consumption of elastomers increased from an average 3,340,000 tons per annum in the period 1955–57 to 6,606,000 tons in 1966. Consumption of both natural rubber and synthetic rubber increased but natural rubber's share of total elastomer consumption fell from 58 per cent in the period 1955–57 to 39 per cent in 1966.

The main consuming countries, in decreasing order of importance are the United States, the USSR, Japan, the United Kingdom, the member countries of the EEC, and Canada.

The main consuming industry is the tyre industry. In the United States the tyre industry used 65 per cent of all natural rubber consumed in the US between 1953 and 1964. In 1965 and 1966 the proportion rose to 70 per cent.

Synthetic rubber has been used on an increasing scale in both the tyre and non-tyre industries. In the United States natural rubber usage in the tyre industry fell from an average of 44 per cent in the period 1953–55 to around 27 per cent in the period 1961 to 1966. In the non-tyre industry the proportion fell from 42 per cent in the period 1953–55 to 20 per cent in 1966.

## International trade

### *Exports*

World exports of natural rubber increased from an average 1,891,000 tons per annum in the period 1955–59 to 2,277,000 tons in 1966. The main exporting countries, in decreasing order of importance, are Malaysia, Indonesia, Thailand, and Ceylon.

World exports of synthetic rubber rose from an average 347,000 tons per annum in the period 1955–59 to 891,000 tons in 1965. In 1966 the major exporting countries were the United States, Canada, the member countries of the EEC, the United Kingdom, Japan and the German Democratic Republic.

### *Imports*

In 1966 the major importers of natural rubber were the United States, Japan, the United Kingdom, China, the German Federal Republic and France. In 1965 the USSR was second in importance only to the United States.

In 1966 the main importers of synthetic rubber were France, the German Federal Republic, Italy, the United Kingdom, the USSR, Japan and Canada. Imports were fairly steady or increased steadily over the period 1960–66 in all these countries.

### *Stocks*

World stocks of natural rubber increased from 688,000 tons in 1959 to 857,000 tons in 1966 (excluding stocks held in Government stockpiles, in the USSR and in mainland China). Production of natural rubber has tended at certain periods to fall short of consumption, but the deficit has been more than made up in recent years by releases from US Government stockpiles. Since

the 1st July 1967, these have been made at a rate of 70,000 tons per annum, but in February 1969, the US General Services Administration decided to stop rubber sales from the stockpile. This resulted in an immediate boost to prices and RSS No. 1 on the London market reached its highest level for six years.

World stocks of synthetic rubber increased from 335,000 tons in 1959 to 677,000 tons in 1966. In 1966 the major stockholders, in decreasing order of importance, were the United States, France, Japan, Canada, and the United Kingdom.

*Prices*

Natural rubber prices have fallen almost continuously in recent years from a price of 108·1 Malaysian cents/lb f.o.b. Singapore for RSS1 in 1960 to 45·4 cents/lb in February 1968. Prices began to recover in March and were quoted at 57·25 cents/lb in August 1968. Prices of other grades of rubber and rubber from other sources moved in much the same way. Following the decision of the US/GSA to stop sales from the stockpile, the price in February 1969 for RSS1 rose to 77 cents/lb.

The general decline is attributable to several main factors:

(a) Increasing production in Malaysia as a result of the replanting scheme.
(b) Heavy releases in the past from US government stockpiles.
(c) Spasmodic buying performances by some of the centrally planned economies.
(d) Lower levels of economic activity in most developed countries and hence lower demand.
(e) Competition from synthetic rubber.

In the long run the price of *cis*-polyisoprene is likely to set a price-ceiling for natural rubber. In Malaysia it is believed that a repetition of the price decline of recent years can be avoided, but that the long-term price trend of natural rubber will not be favourable to producers. The US/GSA decision, though welcome, is regarded merely as a temporary palliative and the size of the stockpile is still considered, in many quarters, to be a threat to the market.

## Future prospects

It has been forecast that world production of natural rubber could increase by 3 per cent in 1968 and is likely to continue increasing into the 1970's as replanted trees reach maturity.

Supplies of synthetic rubber could increase by up to 10 per cent in 1968 and by much more in the 1970's as new producing countries enter the market.

Demand for elastomers is expected to continue its upward trend, the demand for synthetic rubber increasing more rapidly than that for natural rubber.

A large part of the increased demand for natural rubber is expected to come from increases in tyre production and from the larger quantity of natural rubber used per tyre in the newer types of tyres.

It is generally felt that production of natural rubber will increase more rapidly than consumption in the near future and that stocks will therefore accumulate.

The future for natural rubber seems fairly promising provided it can remain competitive with synthetic rubber. This could be achieved by lowering production costs and by presenting natural rubber in a form comparable to that of synthetic rubber. Both these developments are currently taking place.

# The market for natural rubber with particular reference to the competitive status of natural rubber

## INTRODUCTION

World demand for elastomers is satisfied by natural rubber and synthetic rubber.

Over the period 1955 to 1967 production of both natural and synthetic rubbers increased. Consumption of synthetic rubber increased over the period while consumption of natural rubber increased to 1966 but fell somewhat in 1967. Table 1 shows world production and consumption of natural and synthetic rubbers in recent years.

**Table 1**
**World rubber situation**
('000 tons)

| | | 1955–57 | 1962–64 | 1965 | 1966 | 1967 Prelim. |
|---|---|---|---|---|---|---|
| Production | NR | 1,936 | 2,175 | 2,380 | 2,438 | 2,494 |
| | SR | 1,454(1) | 3,121(1) | 3,765(1) | 4,157(1) | 4,310(1) |
| Consump-tion | NR | 1,920 | 2,273 | 2,421 | 2,571 | 2,499 |
| | SR | 1,420 | 3,027 | 3,694 | 4,035 | 4,168 |

(1) Estimate.
**Source:** Derived from *FAO Commodity Review*, 1968.

It can be seen that production of natural rubber tended to fall short of consumption whereas production of synthetic rubber tended to exceed consumption.

Production of synthetic rubber caught up with that of natural rubber in 1961 and has since exceeded it. Since 1963 consumption of synthetic rubber has exceeded that of natural rubber.

The share of the world elastomers market held by natural rubber fell from 58 per cent in the period 1955–57 to 37 per cent in 1967.

### Natural rubber

Virtually all the natural rubber used in the world to-day is obtained from the tree *Hevea brasiliensis* L. (Willd. ex A. Juss.) Muell.-Arg. This tree, indigenous to Brazil, was introduced into Asia towards the end of the 19th century. Although there is some production of raw natural rubber in South America that sells in insignificant quantities in some markets, production is now based mainly in Asia, particularly in Malaysia and Indonesia. Production in Asia is almost entirely from plantation rubber.

Rubber is produced in the bark of *Hevea*. The rubber is contained in latex which is obtained by cutting the bark, so rupturing the latex vessels and enabling the latex to flow.

In March the leaves fall from the trees and the flow of latex is reduced. This process is known as 'Wintering' and can entail production cuts of up to 30 per cent.

The rubber content of *Hevea* latex increases with the age of the tree, which, if a high yielding variety, will take about 12 years to reach maturity. It also varies with season. Fresh latex consists of around 33 per cent rubber, 3 per cent non-rubber solids and 64 per cent water. Malaysian rubber has a mean dry rubber content (DRC) of 33–34 per cent.

*Hevea* rubber contains over 90 per cent of rubber hydrocarbon, quantities of sugars, inorganic compounds, resins and traces of other organic compounds. The resilience and elasticity of natural rubber are due to the rubber hydrocarbon, which is polyisoprene. The non-rubber constituents of natural rubber contribute to the coagulation, preservation and vulcanization of the rubber.

Latex obtained from the tree may either be concentrated by removing the water and sold as latex concentrate, or coagulated by the addition of a chemical and made into dry sheet rubber. (Further methods of presentation have recently been introduced and are considered in greater detail below.)

From Malaysia, approximately 85 per cent of the latex produced is shipped as dry rubber. The remaining 15 per cent is shipped as latex concentrate and constitutes the main world supply of latex concentrate. (No producers in Malaysia produce latex only, but change to production of sheet rubber if the premium which latex commands over sheet falls too low.)

Recent years have seen several major developments in the production and presentation of natural rubber:

(a) Plantations have been replanted on an increasing scale with high yielding trees. Some of the most recent plantings are of clones, that is, the selected progeny of a single parent, which have proved capable, on a trial basis, of yields of 3,000 lb. or more per acre at maturity.

(b) The application of plant hormones such as 2:4-D or 2:4:5-T[1] as yield stimulants has led to increases in production from mature trees of up to 20 per cent.

(c) Various processing developments have occurred notably the 'comminution' process, the 'extruder mincing/pelletization' process and the 'Heveacrumb' process. These all produce, by various means, a granulated rubber which is shipped in solid bales. They are all particularly suited to the processing of the scrap rubber which constitutes 15 per cent of the production of most estates. Scrap rubber is in the form of cup coagulum, that is, the rubber left in the collecting cups, and tree lace, which is the coagulated rubber collected daily from the tapping cuts. The new methods can process both good rubber and scrap rubber to produce an extremely acceptable end product. They are also particularly suited to the production of CV and OE natural rubber (see below).

Table 2 shows the residual dirt content of rubber processed by each of these new processes. The starting material in each case was cup lump rubber with a 1 per cent dirt content.

---

(1) 2:4-D 2,4 dichlorophenoxy acetic acid
2:4:5-T 2,4,5 trichlorophenoxy acetic acid

**Table 2**
**Residual dirt content**

| Process | % |
|---|---|
| Comminution | 0·05 |
| Pelletization | 0·05 |
| Heveacrumb | 0·02 |

The increasing importance of these new methods of production is shown in Table 3 which gives estimated Malaysian production in recent years.

**Table 3**
**Estimated Malaysian production by new processes**
('000 tons)

| | Total | of which Heveacrumb |
|---|---|---|
| 1963 | 0·1 | — |
| 1964 | 1·2 | — |
| 1965 | 5·7 | 0·4 |
| 1966 | 17·9 | 6·1 |
| 1967 | 33·3 | 18·3 |
| 1968 | 112·0 | 93·5 |

**Source:** *FAO Commodity Review*, 1968.

The Rubber Research Institute of Malaysia, who developed the Heveacrumb process, expects that 100,000 tons per annum will be produced by this process in Malaysia by the end of 1969. It is understood that Indonesian producers are hoping to adopt crumb rubber processing by one or more of the possible methods by early 1970.

Sheet rubber hardens during storage making it more difficult to store and use. Constant viscosity rubber is produced by the addition before coagulation of small quantities of hydroxylamine hydrochloride. The produce is known as constant or controlled viscosity (CV) rubber. In early 1968 all CV Heveacrumb produced was exported to the United States.

It is desirable that rubber should have a low, as well as constant, viscosity. Rubber from some trees has too high a viscosity for easy processing. This can be lowered by the addition of up to 4 per cent of oil, the viscosity then being fixed by the addition of hydroxylamine. The cost of these additives for fixing low viscosity (LV) rubber is said to be offset by the gains from the simpler processing it makes possible.

It has now been found practicable to extend natural rubber with mineral oil in proportions of up to 30 per cent without seriously affecting the properties of the rubber. By making the rubber cheaper this makes it more competitive with the oil-extended synthetic rubbers. It has also been found that oil-extended natural rubber (OENR) can be blended with a synthetic rubber, *cis*-polybutadiene, to form a compound which is eminently suitable for car-tyre treads.

The new methods of rubber production give a solid bale of rubber rather than a sheet. When small bales of natural rubber first appeared the synthetic rubber bale size of 28" x 14" x 6" was copied. The Rubber Research Institute of Malaysia has now developed a bale 22½" x 15" x 7" weighing 75 lb which must be wrapped in polythene film of specified thickness and which conforms to the ISO (International Standards Organization) pallet sizes. These bales of rubber are sold as Standard Malaysian Rubber (SMR). Most SMR is of crumb type but there is a certain amount of SMR sheet and crepe on the market.

Baled rubber has to be graded by technical specifications; the sheet rubber classifications, based on appearance, are not applicable to solid rubber. SMR specifications and International descriptions of ribbed smoked sheet (RSS) rubber are given in the Appendix.

The Rubber Research Institute intends that SMR technical specifications will eventually replace the RSS classification. The SMR scheme started in 1965, with 1966 being the first complete year of operation. Around 8,000 tons of SMR were exported from Malaysia in 1966. Exports rose to nearly 24,000 tons in 1967 and it has been estimated[1] that over 100,000 tons will be exported in 1968 and possibly 250,000 tons in 1969. If achieved, the 1969 figure would represent 25 per cent of total Malaysian production.

## Synthetic rubber

There are many types of synthetic rubber, all of which are competitive, at least to some extent, with natural rubber.

Synthetic rubbers may be broadly classified as general purpose rubbers and special purpose rubbers. General purpose rubbers include styrene-butadiene rubber (SBR), polybutadiene, polyisoprene and ethylene-propylene copolymers. The special purpose rubbers include neoprene rubbers, nitrile rubbers and butyl rubbers.

SBR is not only the synthetic rubber produced in the largest quantities, it is also the cheapest. It is less resilient than natural rubber and more prone to heat accumulation when subjected to continually changing stresses. (High hysteresis.) For this reason SBR is not suitable for use in large or heavy duty tyres. However, SBR plays a large part in the manufacture of passenger-car tyre treads; oil-extended SBR is used, in conjunction with varying amounts of polybutadiene, less where adhesion on wet roads has priority and more where durability is of greater importance.

Polybutadiene is now being used to some extent in large tyre treads also.

Polyurethane rubbers have been used very successfully in the somewhat limited sphere of solid tyres because tyres made of this material have a particularly long life. Polyurethane rubbers are also used in engineering components and in footwear.

Polyisoprene exhibits properties most similar to those of natural rubber, synthetic *cis*-1,4-polyisoprene being sometimes known as 'synthetic natural rubber'. This rubber is produced on a small but growing scale and is likely to present the greatest threat to natural rubber in the long run, particularly in those end uses in which natural rubber has previously been thought irreplaceable.

Of the special purpose rubbers, polychloroprene (neoprene) and nitrile rubbers are the main oil resistant synthetic rubbers, and are used in hoses, for window gaskets and for similar purposes. Butyl rubbers are highly impermeable to gas and are used mainly for car inner tubes. (Approximately 50 per cent of US production of butyl rubber is used in tyres and tyre products[2].) Chlorinated butyl rubber is now the main material used for tubeless tyre interliners. Butyl rubbers are also resistant to sunlight and weathering and are used increasingly for roofing and reservoir sheeting.

'Thermoplastic' synthetic rubbers have been developed in which the molecular

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(1) Natural Rubber Producers Research Association (NRPRA) Annual Report, June 1968.

(2) *Oil Paint and Drug Reporter* 6.5.68.

crosslinks break on heating and reform on cooling, so enabling articles to be shaped without vulcanization.

Synthetic latex is used increasingly in carpet backing, particularly because it requires little compounding and no vulcanizing.

## Uses of rubber

The main market for all elastomers is the tyre industry. Other important end uses include footwear, belting, electrical insulation, flooring materials, surgical goods and foam rubber products.

The rubber used in different types of tyre tread varies according to the type of tyre and also with the country of manufacture. Generally speaking, natural rubber is the preferred choice for heavy-duty and large truck tyres while oil-extended synthetic rubbers are widely used in the treads of passenger car tyres. Light truck tyres are an intermediate case although there is a current tendency to use less natural rubber in these tyres. This trend may be off-set, however, by the development of oil-extended natural rubber.

Table 4 shows the composition of the average American passenger car tyre from which the dominant position of synthetic rubber in this field may be seen.

**Table 4**
**Typical passenger car tyre constitution in USA**

| | lb. | % |
|---|---|---|
| Synthetic rubber | 7·5 | 34·0 |
| Natural rubber | 2·5 | 11·3 |
| Carbon black | 6·0 | 27·2 |
| Chemicals | 4·0 | 18·1 |
| Fabric | 1·5 | 7·2 |
| Steel | 0·5 | 2·2 |
| Totals: | 22·0 | 100·0 |

**Source:** *Progress of Rubber Technology*, The Institute of the Rubber Industry, 1967, **31**, 54.

Natural rubber finds many uses in engineering. In recent years it has been developed for use in hydrolastic suspensions, locomotive drive couplings, dock fenders, gaskets and bridge bearings. Natural rubber is used to an increasing extent to replace steel springs.

Rubber latex is used for making dipped goods such as toy balloons, household gloves and similar products. Latex has also found an important use as a backing compound for tufted carpets which are tending to replace traditional woven carpets in many countries.

## A short comparison of natural and synthetic rubbers

Sheet natural rubber has the comparative disadvantage that it often needs guillotining, further cleaning, and plasticizing before it enters the mixer where the filler is added. (The filler is the inert compound such as carbon black which is added to increase bulk and, in some cases, to strengthen the rubber.) Both synthetic polyisoprene and the newly-developed bales of natural rubber in crumb form (e.g. Heveacrumb CV) have the advantage that they can be put straight into the mixer. The supremacy of synthetic rubber as far as processing economies are concerned is, therefore, no longer complete.

Study of the comparative properties of products made from natural and synthetic rubber shows that natural rubber products are better in all those properties which stem from natural rubber's superior ability to crystallize when stretched, e.g. abrasion under severe conditions and tear resistance at high temperatures. Natural rubber is somewhat faster curing and has better resistance to age under some conditions. Both these attributes derive from the non-rubber content of natural rubber.

In the past the main reasons for the use of synthetic rather than natural rubber were its more predictable availability and lower price. When polyisoprene was developed, in addition to certain intrinsic advantages, it appeared to duplicate the properties of natural rubber so closely that it was viewed as a serious and immediate threat to the natural rubber industry.

However, developments in the processing and presentation of natural rubber, which are being made on an increasing scale, are again making natural rubber more competitive with synthetic rubber. It appears that natural rubber will continue to be used in many specialist uses where cost is not the over-riding factor. This would appear to be borne out by the statistics shown in Table 1 and considered in detail below where it may be seen that, although natural rubber's share of the elastomer market fell over the period considered, production and, until 1966, consumption of both natural and synthetic rubbers increased.

## PRODUCTION

### Natural rubber

Available statistics show that the area under rubber is expanding in most producing countries. Total known acreage increased from around 8 million acres in the period 1955–59 to 12 million acres in 1960 and 14 million acres in 1965. The largest areas were Indonesia, West Malaysia, Thailand and Ceylon. Table 5 gives a breakdown by country of the total acreage under natural rubber in several selected years.

**Table 5**
**Area under rubber**
(Percentage of total known area)

| | 1955–59 Average | 1960 | 1965 |
|---|---|---|---|
| West Malaysia | 46 | 32 | 31 |
| Indonesia | 16 | 38 | 36 |
| Thailand | 10 | 10 | 13 |
| Ceylon | 9 | 6 | 4 |
| Other countries | 19 | 14 | 16 |

**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, No. 11, 1967.

Table 6 shows the most recent percentage breakdown of the above areas by types of cultivation. For this purpose a smallholding is usually taken to be less than 100 acres.

It may be seen that the greater part of the acreage under rubber is in the form of smallholdings.

There is a general trend towards replanting with high-yielding clones. In West Malaysia it is estimated that around 80 per cent of the estates and 40 per cent of the smallholdings have been replanted with high-yield clones.

**Table 6**
**Area under Rubber**
(Percentage breakdown by type of cultivation)

| Territory | End of | Estates | Small-holding | High Yield Clones | Low Yield Clones |
|---|---|---|---|---|---|
| West Malaysia | 1965 | 44 | 56 | 64 | 36 |
| Indonesia | 1961 | 28 | 72 | n.a. | n.a. |
| Thailand | 1965 | — | 100(1) | 27 | 73 |
| Ceylon | 1965 | 50(1) | 50(1) | 57 | 43 |

n.a.: not available.
(1) Estimate.
**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, No. 11, 1967.

The average yield per acre on estates in West Malaysia increased from 400 lb in 1955 to more than 850 lb in 1965. Research into higher-yield clones continues and is financed by a cesse on exports. It is expected[1] that all pre-1940 estate rubber trees will have been replanted with high-yield material by 1977.

Statistical appendix 1 shows the quantities of natural rubber produced in the principal producing countries. Total world production increased from 1,990,000 tons in 1960 to 2,400,000 tons in 1966 and to 2,500,000 tons in 1967[2].

Malaysia (including Singapore) is the world's largest producer of natural rubber. Production increased steadily from 780,000 tons in 1960 to 988,000 tons in 1966. Most of this production came from West Malaysia and Singapore which together produced 708,000 tons in 1960 and 928,000 tons in 1966. Production in 1967 has been estimated at 1,026,000 tons of which 953,000 tons will come from West Malaysia. The increase was the result of two separate but complementary actions: (1) replanting with high yield clones as mentioned above and (2) the planting of large areas of virgin land with rubber. By 1968 the Malaysian Federal Land Development Authority had planted 183,000 acres with rubber and oil palm, of which 125,150 acres were rubber. However, in 1968 it was decided to cut down on rubber planting and to plant oil palm whenever possible.

Indonesia is the second largest producer of natural rubber. Production rose from 610,000 tons in 1960 to an estimated 700,000 tons in 1966.

Production in Thailand rose from 168,000 tons in 1960 to 218,000 tons in 1964 but fell to 204,000 tons in 1966.

In Ceylon the replanting scheme instituted in 1953 led to an increase in production from 97,000 tons in 1960 to 129,000 tons in 1966 despite a fall in total acreage of around 100,000 acres since 1964 and a fall in the rate of replanting.

Countries, other than the major producers, which are known to be growing rubber include Brazil, Brunei, Burma, Cambodia, Cameroun, Congo (Kinshasa), Ghana, India, Liberia, Nigeria, Papua, and Vietnam. Output fell in 1967 in Brazil, Nigeria and Vietnam but rose in India and Liberia.

## Synthetic rubber

Appendix 2 shows world production of synthetic rubber. Statistics of production in the USSR and mainland China are not available.

(1) *The Public Ledger*, 8.2.68

(2) Preliminary figure quoted in *FAO Commodity Review*, 1968

In 1960 and 1961 total production of synthetic rubber was approximately equal to production of natural rubber but has exceeded production of natural rubber since 1962. In 1962, 2,361,000 tons of synthetic rubber were produced compared with 2,130,000 tons of natural rubber. By 1966, production of synthetic rubber had increased to 3,500,000 tons while production of natural rubber had increased to 2,400,000 tons. A preliminary figure of production of synthetic rubber in 1967 is 4,310,000 tons. (This includes an estimated 640,000 tons from the USSR.)

The major producer is the United States where production increased from an average 1,121,000 tons per annum in the period 1955–59 to 1,970,000 tons in 1966. In 1966 the US produced 56 per cent of all the synthetic rubber produced outside the USSR and China. Production is understood to have fallen somewhat in 1967 owing to prolonged strikes in the rubber-manufacturing industry.

Prior to 1966, Canada was the second largest producer for which statistics exist, production increasing from an average 119,000 tons per annum in the period 1955–59 to 203,000 tons in 1965 and falling to 200,000 tons in 1966. It is understood that production fell again slightly in 1967.

In 1966, Japan displaced Canada as to the second largest producer having expanded production from 18,000 tons in 1960 to 228,000 tons in 1966. Production rose rapidly by a further 50,000 tons in 1967.

Other large producers of synthetic rubber include the member countries of the European Economic Community, the United Kingdom, and the German Democratic Republic. In 1967 production in France increased by about 25,000 tons, but production fell in the German Federal Republic as a result of a general slowing down in the rate of economic growth. Production in the United Kingdom has risen steadily from an annual average of 14,000 tons in the years 1955–59 to 90,000 tons in 1960 and thereafter increasing annually up to 191,000 tons in 1966. The German Democratic Republic also recorded steady production increases which reached 100,000 tons in 1966. Production increased rapidly in India and Argentina although total production in these countries is, as yet, small.

It has been estimated[1] that production in the USSR was around 500,000 tons in 1965 which, if correct, would make the USSR the second major world producer of synthetic rubber.

In recent years production of synthetic rubber has been marked by over production and by a growing overproductive capacity. It has been estimated[2] that, in 1967, the UK synthetic rubber industry was operating at around 80 per cent capacity, the US at 76 per cent, the French at 70 per cent and the industry in the German Federal Republic at 63 per cent. The cuts in production which occurred in many countries in 1967 were, generally speaking, cuts in the production of SBR[3]. Output of other synthetic rubbers continued to rise. In the United States production of polybutadiene rose by 8 per cent and production of other synthetic types by more than 20 per cent.

## CONSUMPTION

Total world consumption of elastomers (see Table 1) increased from an average 3,340,000 tons per annum in the period 1955–57 to 6,606,000 tons in 1966, an increase of 98 per cent.

(1) *Plantation Crops*, Commonwealth secretariat. No. 11. 1968

(2) *Financial Times* 29.7.68.

(3) *FAO Commodity Review*, 1968

Consumption of both natural and synthetic rubber increased over the period. Annual consumption of natural rubber increased from an average 1,920,000 tons in the period 1955–57 to 2,571,000 tons in 1966, an increase of 34 per cent. Preliminary figures for 1967 show a fall to 2,499,000 tons.[1] Consumption of synthetic rubber rose from an average 1,420,000 tons per annum in the period 1955–57 to 4,035,000 tons in 1966, an increase of 184 per cent. Preliminary figures for 1967 show a further rise to 4,168,000 tons. Thus, in 1966, 39 per cent of total consumption was of natural rubber compared with 58 per cent in the period 1955–57.

In 1966 the major consuming countries in decreasing order of importance were the United States, the USSR, Japan, the United Kingdom, the German Federal Republic, France, Italy and Canada.

Appendices 3 and 4 give consumption of natural and synthetic rubbers in the main consuming countries.

*The United States*

Total consumption of elastomers rose from an average 1,485,000 tons per annum in the period 1955–59 to 2,222,000 tons in 1966, an increase of 50 per cent. Preliminary figures for 1967 show a fall to 2,162,000 tons. This fall was caused mainly by a three-month strike in the rubber manufacturing industry. Consumption of natural rubber fell from an average 555,000 tons per annum in the period 1955–59 to 427,000 tons in 1961 but then recovered to 550,000 tons in 1966. Preliminary 1967 figures show a fall to 506,000 tons. Consumption of synthetic rubber increased from an average 930,000 tons per annum in the period 1955–59 to 1,672,000 tons in 1966 and then fell to a preliminary figure of 1,656,000 tons in 1967.

*The USSR*

Estimated total elastomer consumption rose from an average 400,000 tons per annum in the period 1955–59 to 886,000 tons in 1966 an increase of 121 per cent. Consumption of natural rubber, taken as net imports, rose from an average 140,000 tons per annum in the period 1955–59 to 330,000 tons in 1961 and 1962, fell to 160,000 tons in 1964 and rose again to 276,000 tons in 1966. It is reported that consumption fell in 1967, probably as a result of substitution with synthetic rubber. Estimated consumption of synthetic rubber rose from an average 260,000 tons per annum in the period 1955–59 to 600,000 tons in 1964. Estimated consumption remained at this level until 1966.

*Japan*

Total consumption of elastomers increased steadily from an average 138,000 tons per annum in the period 1955–59 to 432,000 tons in 1966, an increase of 213 per cent. Consumption of natural rubber increased from an average 123,000 tons per annum in the period 1955–59 to 213,000 tons in 1966. It is reported that consumption continued to increase in 1967. Consumption of synthetic rubber increased rapidly from an average 15,000 tons per annum in the period 1955–59 to 219,000 tons in 1966.

*The United Kingdom*

Total consumption of elastomers increased from an average 254,000 tons per annum in the period 1955–59 to 371,000 tons in 1966, an increase of 46 per

(1) *FAO Commodity Review*, 1968

cent. Consumption of natural rubber decreased from an average 201,000 tons per annum in the period 1955–59 to 164,000 tons in 1962. Consumption then increased to 181,000 tons in 1966 but fell again in 1967. Consumption of synthetic rubber increased from an average 53,000 tons per annum in the period 1955–59 to 190,000 tons in 1966.

*German Federal Republic*

Total consumption of elastomers increased from an average 185,000 tons per annum in the period 1955–59 to 364,000 tons in 1966, an increase of 97 per cent. Consumption of natural rubber increased from an average 138,000 tons per annum in the period 1955–59 to 155,000 tons in 1966, but is reported to have fallen in 1967 because of the lower output of automobiles which resulted from the slowing down of economic growth. Consumption of synthetic rubber increased from an average 47,000 tons per annum in the period 1955–59 to 209,000 tons in 1966.

*France*

Total consumption of elastomers increased from an average 179,000 tons per annum in the period 1955–59 to 287,000 tons in 1966, an increase of 60 per cent. Consumption of natural rubber averaged 135,000 tons per annum in the period 1955–59 but was steady about 125,000 tons in the period 1960–66. Consumption of synthetic rubber increased from an average 44,000 tons per annum in the period 1955–59 to 165,000 tons in 1966.

*Italy*

Total consumption of elastomers rose from an average 78,000 tons per annum in the period 1955–59 to an estimated 217,000 tons in 1966, an increase of 178 per cent. Consumption of natural rubber increased from an average 56,000 tons per annum in the period 1955–59 to an estimated 90,000 tons in 1966. It is reported that this increase continued in 1967. Consumption of synthetic rubber increased from an average 22,000 tons per annum in the period 1955–59 to an estimated 127,000 tons in 1966.

*Canada*

Total consumption of elastomers rose from an average 90,000 tons per annum in the period 1955–59 to 154,000 tons in 1966, an increase of 71 per cent. Consumption of natural rubber fell from an average 42,000 tons per annum in the period 1955–59 to 32,000 tons in 1961. It then increased to 47,000 tons in 1966 but it is reported to have fallen again in 1967. Consumption of synthetic rubber increased from an average 48,000 tons per annum in the period 1955–59 to 107,000 tons in 1966.

*Usage by sector*

Table 7 shows consumption of natural rubber by product sector in some of the major consuming countries.

In the periods 1953–55, 1961–63 and in 1964, 65 per cent of natural rubber consumed in the United States was used in the tyre industry. In 1965 and 1966 the proportion rose to 70 per cent.

**Table 7**
**Consumption of natural rubber by product sector**
('000 tons)

| Country | Sector | Average 1953–55 | Average 1961–63 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|
| US | Tyres | 391 | 297 | 319 | 361 | 392 |
| | Non-tyres | 214 | 159 | 171 | 162 | 166 |
| UK | Tyres | 129 | 79 | 84 | 89 | 89 |
| | Non-tyres | 112 | 90 | 100 | 98 | 95 |
| France | Tyres | 76 | 78 | 77 | 77 | 78 |
| | Non-tyres | 52 | 50 | 50 | 46 | 46 |
| Canada | Tyres | 28 | 24 | 29 | 31 | 35 |
| | Non-tyres | 14 | 10 | 12 | 12 | 12 |
| Federal Republic of Germany | Tyres | n.a. | 74 | 78 | 78 | 80 |
| | Non-tyres | n.a. | 72 | 77 | 75 | n.a. |
| Japan | Tyres | n.a. | 90 | 98 | 95 | n.a. |
| | Non-tyres | n.a. | 99 | 108 | 107 | n.a. |

n.a. : not available
**Source**: *Agricultural Commodities and Projections*, 1975–1985. FAO Rome, 1967

In the United Kingdom 54 per cent of natural rubber consumed was used by the tyre industry in the period 1953–55. After 1961 the proportion was steady at around 47 per cent.

In France the tyre industry absorbed a steady 61 per cent throughout the period.

In Canada the proportion of natural rubber consumed by the tyre industry increased from 67 per cent in the period 1953–55 to 71 per cent in the period 1961–63. It then increased gradually to 74 per cent in 1966.

Statistics for the whole period are not available for the German Federal Republic and Japan but from 1961 to 1965 the West German tyre industry used around 51 per cent of total natural rubber consumed while, over the same period, the Japanese tyre industry used around 48 per cent.

Table 8 shows the consumption of synthetic rubber by product sector for the same countries as in Table 7.

**Table 8**
**Consumption of synthetic rubber**
('000 tons)

| Country | Sector | Average 1953–55 | Average 1961–63 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|
| US | Tyres | 488 | 754 | 899 | 966 | 1041 |
| | Non-Tyres | 296 | 487 | 576 | 599 | 657 |
| UK | Tyres | 5 | 82 | 98 | 104 | 111 |
| | Non-Tyres | 7 | 53 | 71 | 78 | 82 |
| France | Tyres | 8 | 59 | 77 | 84 | 95 |
| | Non-Tyres | 8 | 52 | 64 | 64 | 73 |
| Canada | Tyres | 23 | 52 | 65 | 69 | 80 |
| | Non-Tyres | 12 | 22 | 27 | 28 | 29 |
| Federal Republic of Germany | Tyres | n.a. | 79 | 102 | 124 | 123 |
| | Non-Tyres | n.a. | 54 | 75 | 84 | n.a. |
| Japan | Tyres | n.a. | 49 | 81 | 88 | n.a. |
| | Non-Tyres | n.a. | 57 | 82 | 87 | n.a. |

n.a. : not available
**Source**: *Agricultural Commodities and Projections*, 1975–1985, FAO Rome, 1967

Comparison of Tables 7 and 8 gives a measure of the relative importance of natural and synthetic rubber in the tyre and non-tyre industries for the

countries concerned. In the United States natural rubber usage in the tyre industry, as a proportion of total rubber used, fell from an average 44 per cent in the period 1953–55 to around 27 per cent in the years 1961 to 1966. In the non-tyre products sector the proportion of natural rubber usage fell from an average 42 per cent in the period 1953–55 to 25 per cent in 1961–63. It then fell gradually to 20 per cent in 1966.

In the United Kingdom, the proportion of natural rubber used in terms of total rubber usage in the tyre industry fell from an average of 96 per cent in the period 1953–55 to about 45 per cent in the period 1964 to 1966. In the manufacture of non-tyre products, the proportion fell from an average of 94 per cent in the period 1953–55 to 54 per cent in 1966.

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## INTERNATIONAL TRADE

### EXPORTS

### Exports of natural rubber

Appendix 5 shows exports of natural rubber from producing countries. World exports increased from an average of 1,891,000 tons per annum in the period 1955–59 to 2,277,000 tons in 1966, an increase of 20 per cent. The main exporting countries, in decreasing order of importance, are Malaysia, Indonesia, Thailand and Ceylon.

*Malaysia*

Malaysia is the largest producer and exporter of natural rubber in the world. In 1966 exports from Malaysia (West Malaysia, Sabah and Sarawak) constituted 44 per cent of total world exports. Exports increased from an average 749,000 tons per annum in the period 1955–59 to 997,000 tons in 1966, an increase of 33 per cent. It is reported that exports increased by 200,000 tons in 1967.

A major importer of Malaysian rubber is Singapore which imports around 350,000 tons per annum, all of which is re-exported. Between 1964 and 1966 exports from Malaysia and Singapore averaged 1,056,000 tons per annum. In 1966 the main importers were the USSR, the US and the UK.

**Table 9**
**Exports from Malaysia and Singapore**
(Percentage by destination)

| | 1964 | 1965 | 1966 |
|---|---|---|---|
| UK | 12 | 11 | 9 |
| US | 12 | 12 | 10 |
| Federal Republic of Germany | 9 | 8 | 6 |
| France | 5 | 5 | 5 |
| Italy | 5 | 5 | 5 |
| USSR | 11 | 19 | 19 |
| Japan | 8 | 5 | 5 |
| Others | 38 | 35 | 41 |

**Source:** Derived from *Plantation Crops*, 1967

*Indonesia*

Over the period 1955 to 1966 Indonesian exports were fairly steady, although there was a marked decline in 1963, averaging 650,750 tons per annum as derived from estimated figures. It is reported that exports rose substantially in 1967.

The United States is the largest importer, importing 255,000 tons in 1964 (41 per cent of Indonesian rubber exports) and 291,000 tons in 1965 (43 per cent). Other large importers are China, Japan, the German Federal Republic and the USSR.

**Table 10**
**Exports from Indonesia**
(Percentage by destination)

| | 1963 | 1964 | 1965 |
|---|---|---|---|
| US | 13 | 41 | 43 |
| China | 14 | 17 | 13 |
| Japan | 1 | 15 | 13 |
| Federal Republic of Germany | 3 | 5 | 8 |
| USSR | 8 | 6 | 8 |
| Others | 61 | 16 | 15 |

**Source:** Derived from *Plantation Crops*, 1967

*Thailand*

Exports of natural rubber rose from an average 141,000 tons per annum in the period 1955–59 to 213,000 tons in 1964 and then fell to 199,000 tons in 1966. It is reported that exports increased substantially in 1967. Japan is the major importer followed by the United Kingdom, Malaysia and the German Federal Republic.

**Table 11**
**Exports from Thailand**
(Percentage by destination)

| | 1964 | 1965 | 1966 |
|---|---|---|---|
| UK | 18 | 17 | 16 |
| Malaysia | 12 | 20 | 16 |
| Federal Republic of Germany | 11 | 12 | 8 |
| Japan | 37 | 25 | 31 |
| Others | 22 | 26 | 29 |

**Source:** Derived from *Plantation Crops*, 1967

*Ceylon*

Exports averaged 94,000 tons per annum over the period 1955–63 and then rose to 133,000 tons in 1966, an increase of 41 per cent. A substantial increase is reported for 1967.

China is the major importer followed by the USSR, the US and the German Federal Republic. The proportion of Ceylonese exports going to mainland China rose from 30 per cent in 1964 to 44 per cent in 1966.

*Other countries*

Natural rubber is exported by many other countries including Nigeria, South Vietnam, Cambodia, Liberia and the Congo (Kinshasa).

Exports from Nigeria increased from 41,000 tons per annum over the period 1955–59 to 70,000 tons in 1966. It is reported that exports decreased in 1967 as a result of smaller production.

Exports from South Vietnam fell steadily from 82,000 tons in 1961 to 43,000 tons in 1966 and are reported to have continued falling in 1967.

Exports from Cambodia averaged 38,000 tons per annum over the period 1955–66, rising to a maximum of 68,000 tons in 1965.

Liberian exports were steady about an average 44,000 tons per annum throughout the period 1955–66, but are reported to have increased substantially in 1967.

Exports from the Congo averaged 34,500 tons per annum over the period 1955–64 but fell to 21,000 tons in 1965 and then rose to an estimated 27,000 tons in 1966.

## Exports of synthetic rubber

Appendix 6 gives world exports of synthetic rubber. Total exports rose from an average of 347,000 tons per annum in the period 1955–59 to 634,000 tons in 1960. Exports then rose to 891,000 tons in 1965, an increase of 41 per cent on the 1960 total. A total of 921,000 tons were exported in 1966, not including exports from the USSR.

In 1966 the major exporting countries were the United States, Canada, the member countries of the EEC, the United Kingdom, Japan and the German Democratic Republic.

*United States*

The United States is by far the largest exporter of synthetic rubber. In the period 1955–59 exports averaged 186,000 tons per annum. In 1960, 345,000 tons were exported. Between 1961 and 1966 exports averaged 299,000 tons per annum. The US share of the world export market fell from 54 per cent in 1960 to 32 per cent in 1965. (Share not available for 1966 because total incomplete.) In 1966 the main importers of synthetic rubber from the United States were Canada, France, the German Federal Republic and Japan.

**Table 12**
**Exports from the United States**
(Percentage by destination)

| | 1964 | 1965 | 1966 |
|---|---|---|---|
| Canada | 8 | 10 | 12 |
| France | 9 | 11 | 12 |
| Federal Republic of Germany | 10 | 11 | 11 |
| Japan | 13 | 10 | 10 |
| Mexico | 6 | 6 | 6 |
| Others | 54 | 52 | 49 |

**Source:** Derived from *Plantation Crops*, 1967

The fall in exports to Japan reflects increasing production in Japan.

*Canada*

Exports of synthetic rubber from Canada increased from an average of 83,000 tons per annum in the period 1955–59 to an estimated 130,000 tons in 1966.

The main importers are the United States and the United Kingdom. Exports to the United States increased from 20 per cent of total Canadian exports of synthetic rubber in 1964 to 28 per cent in 1966. Exports to the United Kingdom were fairly steady about 15 per cent of total Canadian exports of synthetic rubber over the period 1964–66.

*EEC countries*

Total exports of synthetic rubber from the EEC rose from 71,000 tons in 1960 to 309,000 tons in 1966, an increase of 335 per cent. The main producer of synthetic rubber within the EEC is the Netherlands. Exports from the Netherlands increased from 7,000 tons in 1960 to 108,000 tons in 1966. The main importers were fellow members of the EEC.

France: Exports of synthetic rubber increased from 7,000 tons in 1960 to 80,000 tons in 1966.

German Federal Republic: Exports increased from 4,000 tons per annum in the period 1955–59 to 21,000 tons in 1960. They then increased to 59,000 tons in 1966.

Italy: Exports increased from 5,000 tons per annum in the period 1955–59 to 36,000 tons in 1960. They then increased to 60,000 tons in 1965 but fell to 42,000 tons in 1966. The main importers are France, the German Federal Republic and, in 1964 and 1965, the USSR.

*United Kingdom*

Exports of synthetic rubber averaged 1,000 tons per annum in the period 1955–59. 20,000 tons were exported in 1960. Exports rose to 58,000 tons in 1966, an increase of 190 per cent over the 1960 total. (These figures include re-exports.)

*Japan*

Exports increased rapidly from 1,000 tons in 1960 to 49,000 tons in 1966.

*Centrally-planned countries*

The main exporters of synthetic rubber within the centrally-planned countries are the German Democratic Republic and the USSR. East German exports averaged 43,000 tons per annum in the period 1955 to 1966, the main importers being the USSR and Poland.

Over the period 1955 to 1965 exports from the USSR averaged 30,000 tons per annum. Exports were somewhat higher in the second half of the period, averaging 35,000 tons per annum from 1960–65.

## Imports of natural rubber

Appendix 7 shows imports of natural rubber into the principal importing countries. In 1966 the major importing countries were the United States, Japan, the United Kingdom, China, the German Federal Republic and France. Statistics of imports of natural rubber into the USSR are not available for 1966, but in the period 1960 to 1965 the USSR was second only to the United States as an importer.

### *United States*

Over the period 1960 to 1966 US imports of natural rubber varied about a mean of 417,000 tons per annum. This was considerably less than the 564,000 tons per annum imported in the period 1955–59. In 1966, 432,000 tons were imported, a fall of 3 per cent from the 1965 level. It is reported that imports increased by 30,000 tons in 1967. Table 13 shows US imports by country of origin. The main sources are Indonesia, Malaysia and Singapore, and Liberia.

**Table 13**
**Imports into the United States**
(Percentage by country of origin)

| | 1964 | 1965 | 1966 |
|---|---|---|---|
| Malaysia & Singapore | 28 | 28 | 26 |
| Indonesia | 49 | 54 | 55 |
| Liberia | 9 | 10 | 10 |
| Others | 14 | 8 | 9 |

**Source:** Derived from *Plantation Crops*, 1967

### *The USSR*

Imports averaged 162,000 tons per annum between 1955 and 1959 and then rose to 356,000 tons in 1962. Imports fell to 183,000 tons in 1964, rising again to 267,000 tons in 1965. Over the period 1963 to 1965, 75 per cent of imports came from Malaysia. Substantial quantities were also imported from Indonesia and Ceylon.

### *Japan*

124,000 tons of natural rubber were imported per annum in the period 1955–59. Imports rose to 170,000 tons in 1960 and continued to rise to 226,000 tons in 1966. The main sources of Japanese imports are Indonesia, Thailand and Malaysia. Imports from Malaysia constituted 80 per cent of Japanese imports in 1959 but the proportion fell to 23 per cent in 1966. They were replaced with imports of cheaper, lower grade rubber from Indonesia and, to a lesser extent, Thailand.

**Table 14**
**Imports into Japan**
(Percentage by country of origin)

| | 1964 | 1965 | 1966 |
|---|---|---|---|
| Malaysia | 34 | 22 | 23 |
| Thailand | 38 | 27 | 26 |
| Indonesia | 17 | 39 | 42 |
| Others | 11 | 12 | 9 |

**Source:** Derived from *Plantation Crops*, 1967

*United Kingdom*

UK imports of natural rubber averaged 277,000 tons in the period 1955–59. 210,000 tons were imported in 1960 and 272,000 tons in 1961. Imports then fell steadily to 184,000 tons in 1966.

The United Kingdom was the second largest importer of natural rubber until 1960 but was overtaken by the USSR in 1961 and by Japan in 1964.

**Table 15**
**Imports into the United Kingdom**
(Percentage by country of origin)

| | 1961 | 1964 | 1966 |
|---|---|---|---|
| Malaysia | 47 | 62 | 35 |
| Singapore | 21 | | 20 |
| Nigeria | 8 | 13 | 14 |
| Indonesia | 4 | 6 | 12 |
| Thailand | 7 | 8 | 7 |
| Others | 13 | 11 | 12 |

**Source**: Derived from *Plantation Crops*, 1967

The re-export trade of the United Kingdom fell with the fall in imports. Re-exports rose to 119,000 tons in 1961 and then fell rapidly to 6,000 tons in 1966.

*China* (mainland)

Imports of natural rubber (derived from the trade returns of exporting countries) increased from an average 107,000 tons per annum in the period 1955–59 to 113,000 tons in 1960. Imports fell to 89,000 tons in 1961 and then rose steadily to 167,000 tons in 1966.

*EEC countries*

Imports into all the member countries were very steady over the period 1960 to 1966. Imports into West Germany averaged 153,000 tons per annum, into France—124,000 tons per annum, into Italy—81,000 tons per annum, into the Netherlands—21,000 tons per annum and into Belgium—18,000 tons per annum.

Imports into West Germany came mainly from Malaysia and Singapore, and from Indonesia and those into France came mainly from Malaysia and Singapore and from South Vietnam.

*Singapore*

Singapore has a substantial import trade, almost all imports of natural rubber being re-exported. In 1963 Singapore imported 306,000 tons from Malaysia and 256,000 tons from Indonesia. Imports from Indonesia ceased after confrontation and in 1964 Singapore imported only 325,000 tons of which 318,000 tons came from Malaysia. In 1965, 367,000 tons were imported (351,000 tons from Malaysia) and in 1966, 405,000 tons (376,000 tons from Malaysia).

## Imports of synthetic rubber

Appendix 8 gives imports of synthetic rubber into the principal importing countries. In 1966 these were France, Federal Republic of Germany, Italy, the United Kingdom, the USSR, Japan and Canada.

### *EEC countries*

Total imports of synthetic rubber into the member countries of the EEC averaged 108,000 tons per annum in the period 1955–59. Imports rose to 202,000 tons in 1960 but fell to 178,000 tons in 1961. Imports then rose steadily to 300,000 tons in 1966.

In 1966 France was the main importing country. Imports averaged 47,000 tons per annum from 1955–59 and then rose to 94,000 tons in 1960. Imports fell to around 70,000 tons for three years and then rose to 97,000 tons in 1966.

Imports into West Germany increased steadily over the period from 32,000 tons per annum in the period 1955–59 to 97,000 in 1965. 90,000 tons were imported in 1966.

Imports into Italy increased from 17,000 tons per annum in the period 1955–59 to 69,000 tons in 1966.

Imports into Belgium rose from an average 7,000 tons per annum in the period 1955–59 to 26,000 tons in 1966.

Imports into the Netherlands increased from 5,000 tons per annum in the period 1955–59 to 18,000 tons in 1966.

The United States is the main single supplier of synthetic rubber to the EEC, although imports from the US are matched in size by intra-community trade. Substantial quantities are also imported from Canada and the United Kingdom.

### *United Kingdom*

Imports of synthetic rubber fell from 57,000 tons in 1960 to 41,000 tons in 1961 after which they rose steadily to 61,000 tons in 1966. Imports came mainly from Canada, the United States and the Netherlands. Imports from the Netherlands increased rapidly from 1960 until, in 1966, the Netherlands became the major source of UK imports.

**Table 16**
**Imports into the United Kingdom**
(Percentage by country of origin)

| | 1960 | 1962 | 1964 | 1966 |
|---|---|---|---|---|
| Canada | 43 | 46 | 41 | 32 |
| US | 53 | 36 | 30 | 13 |
| Netherlands | 2 | 11 | 18 | 33 |
| France | (a) | 5 | 6 | 13 |
| Others | 2 | 2 | 5 | 9 |

(a) Included in Others
**Source:** Derived from *Plantation Crops*, 1967

*The USSR*

Over the period 1955–59 imports averaged 27,000 tons per annum, Over the period 1960–65 imports were fairly steady about an average of 44,000 tons. Soviet imports come mainly from Italy and the German Democratic Republic.

*Japan*

Over the period 1955–59 imports averaged 18,000 tons per annum. From 1960–66 imports averaged 50,000 tons per annum. The United States is the major source of Japanese imports of synthetic rubber. Substantial quantities are also imported from Canada.

*Canada*

Imports of synthetic rubber, which come almost entirely from the United States, rose steadily from 18,000 tons in 1960 to 41,000 tons in 1966.

## STOCKS

*Natural rubber*

Appendix 9 gives end of year stocks of natural rubber. Except for a fall in 1963 when exports from Malaysia and Singapore increased, world stocks rose steadily from 688,000 tons in 1959 to 857,000 tons in 1966, an increase of 25 per cent. These figures include stocks in producing and consuming countries, and stocks afloat and in transit, but exclude stocks held in the USSR, mainland China, and government stockpiles.

World production of natural rubber is usually less than consumption. In 1966 production fell short of consumption by around 130,000 tons. The deficiency was more than met by US government stockpile releases. Table 17 shows stockpile deliveries from the United States and United Kingdom in the period 1959 to 1968. More and more natural rubber is being produced but hardly fast enough to meet the continuing rise in demand. In 1967, production and consumption of natural rubber was more in balance with production at 2·453 million tons against an estimated consumption of 2·465 million tons, the balance coming from releases from the US stockpile.

**Table 17**
**Stockpile deliveries**
('000 tons)

| | US | UK | Total |
|---|---|---|---|
| 1959 | 7 | 6 | 13 |
| 1960 | 90 | 63 | 159(1) |
| 1961 | 26 | 4 | 30 |
| 1962 | 57 | 10 | 67 |
| 1963 | 85 | 10 | 95 |
| 1964 | 97 | 6 | 103 |
| 1965 | 122 | — | 122 |
| 1966 | 159 | — | 159 |
| 1967, Jan.–June | 122 | | |
| 1967/68 July–March | 71 | | |

(1) Includes 6,000 tons delivered from Italian government stockpiles
**Source**: *FAO Commodity Reviews* 1967, 1968

585,000 tons of natural rubber were made available from government stockpiles in the US, the UK, and Italy in disposal programmes announced in September 1959. These had been sold by mid-1965.

In August 1965 the US government announced the release of 630,000 tons of rubber for orderly disposal at prevailing market prices over 6–7 years. Deliveries were made at the rate of 30,000 tons per quarter until March 1966 when they were increased to 43,000 tons per quarter. The resulting fall in prices, to the lowest level for 18 years, induced producing countries, particularly Malaysia, to appeal for a reduction. The US government agreed to limit sales to 30,000 tons per quarter from 1/1/67. This had little material effect on the market, particularly as Malaysian output continued to rise. The US then agreed to limit deliveries to 70,000 tons per annum from 1/7/67. In the meantime, the Malaysian government bought rubber in the market thus supporting the price. An estimate of the amount bought has been put at 100,000 tons, costing some £16 million. This economically brave policy ameliorated the situation for a period. The background and aftermath of this policy is dealt with in greater detail in the following section on 'Prices'. In August 1968 it was announced that releases from the US stockpile would continue at the rate of 70,000 tons per annum but that the policy of dividing this total up into quarterly allotments of 17,500 tons would be abolished. Buyers were then able to purchase any quantity at any time up to the maximum of 70,000 tons.

It had been declared that the US government stockpile would be run down to a level of 132,000 tons, a total which would have been reached by 1972 at the present rate of disposal. However, in February 1969, the US General Services Administration decided to stop rubber sales from the stockpiles. This resulted in an immediate boost to prices and RSS No. 1 on the London market reached its highest level for six years.

### Synthetic rubber

Appendix 10 gives end of year stocks of synthetic rubber. World stocks, excluding government stocks, increased from 335,000 tons in 1959 to 677,000 tons in 1966, an increase of 102 per cent. In 1966 the major stockholders, in decreasing order of importance were the United States (348,000 tons), France (55,000 tons), Japan (46,000 tons), Canada (28,000 tons) and the United Kingdom (25,000 tons).

United Kingdom stocks of synthetic rubber fell from 29,000 tons in 1965 to 25,000 tons in 1966 but stocks held in all the other major stockholding countries increased over the same period.

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## PRICES

Appendix 11 gives selected wholesale, export and import prices of natural rubber and US wholesale prices of synthetic rubber. Annual figures, that is averages of daily prices throughout each year, are available up to 1966. Also shown are monthly average prices for all categories from April 1966 to August 1967 and for exports from Singapore to May 1968.

Rubber from Malaysia and Singapore is a market leader to the extent that world rubber prices tend to reflect prices current in Singapore and London markets.

The price of exports of RSS1 from Singapore fell from an annual average price of 108·1 cents/lb f.o.b. in 1960 to 65·4 cents/lb in 1966. Over the same period the price of exports of RSS3 fell from 104·9 cents/lb to 63·8 cents/lb.

In London the price of RSS3 fell from 30·6 pence/lb c.i.f. in 1960 to 19·1 pence/lb in 1966.

The monthly average price of exports of RSS1 from Singapore fell from 68·7 cents/lb f.o.b. in May 1966 to 45·4 cents/lb in February 1968. Over the same period the price of RSS3 fell from 66·2 cents/lb to 43·5 cents/lb. Prices began to rise in March 1968 and have continued to do so. RSS1 was quoted at 57·25 cents/lb in August 1968. Figure 1 shows these price movements. There tends to be a seasonal recovery of prices in September and October each year when the main part of the new crop reaches the market and consumers start their Autumn buying season. This recovery can be seen clearly in 1966 and is observable in 1967. The rise in prices occurring in June 1967 was a result of the Middle East crisis while that in late 1967 was a result of the support buying policies of the Malaysian government. Prices tended to fall faster in the second half of 1967 than in the first as consumption of natural rubber declined because of strikes and economic recessions in consuming countries.

A consideration of the price trends of natural rubber over the last few years shows the major factors which have affected, and in many cases continue to affect, the price of rubber.

The general fall in prices commenced in 1960 and continued, except for a slight improvement in 1965, until early 1968. Prices were firm during the first half of 1965 because the market expected imports into the USSR and because there were no supplies from Indonesia as a result of confrontation. Prices on the London market were firm because of a shortage of nearby rubber in London. Prices began to fall again in July 1965 following announcements of coming stockpile releases by the US government and reductions in the price of synthetic rubber. Also natural rubber production had increased after the wintering period. Prices recovered at the end of 1965 after substantial purchases by the USSR and East European countries and as a result of rising demand in the United States, particularly in the car industry.

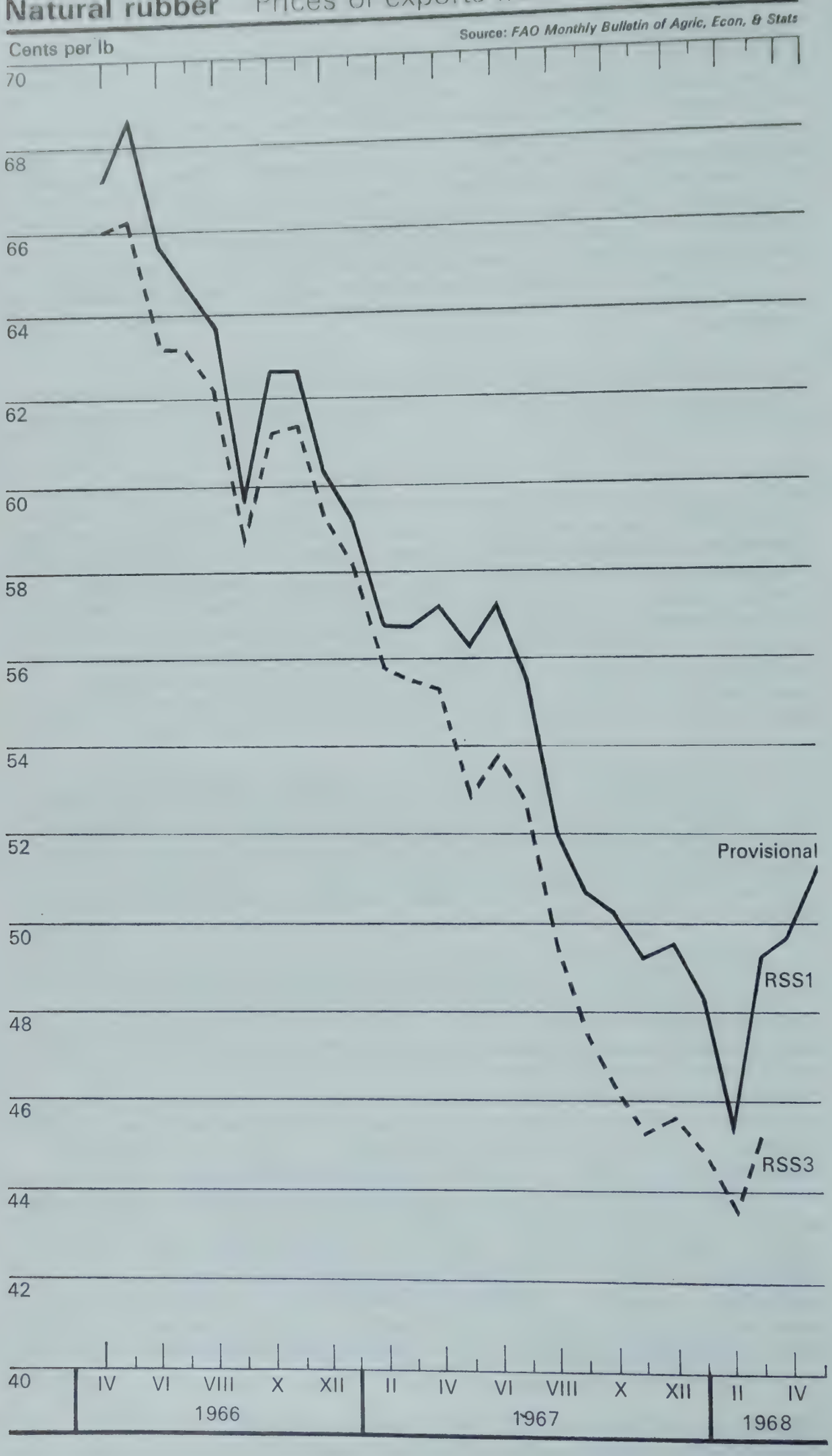
Prices began to fall again in mid-1966 following the announcement of further US stockpile releases. The decline was accelerated by several factors: (a) a sudden influx of Indonesian supplies was expected via the Singapore market and (b) purchases by the USSR and mainland China levelled off and there were signs of deflationary tendencies in several western European countries. After the end of confrontation, Indonesia re-entered the Singapore market in late 1966 and these additions to supply perpetuated the price decline.

In 1967 the rate of US stockpile release was cut but prices continued to fall. This reflected the lessened activities of the motor industries of the United States and Western Europe, a 10 per cent cut in the price of synthetic rubber, and increasing stocks in producing countries. Prices continued to fall until mid-September when the Malaysian government announced a support buying scheme whereby they would buy rubber from producers and sell direct to consumers. This policy had some success and prices began to recover. In December, however, prices began to fall again and continued to do so into 1968 reaching, in February, the lowest level since 1949. Continued buying by the Malaysian government failed to halt this fall which was caused by several factors: (a) Chinese dealers were releasing stocks in order to pay staff bonuses for the Chinese New Year, (b) 12,000 tons of rubber were dumped on the market when it was rumoured that the Suez Canal would re-open, (c) production increased by 18,000 tons in December and (d) the £ sterling was devalued in November 1967 and there was an economic squeeze in the United States. However, the support policy of the Malaysian government cannot but have ameliorated the situation.

In February 1968 the price of RSS1 fell to 44⅜ Malaysian cents/lb f.o.b. Singapore, the lowest price since 1949 and then prices began to recover reaching 57¼ cents/lb by August 1968. The rise in price was caused by

Figure 1

**Natural rubber** Prices of exports from Singapore



simultaneous increases in demand and falls in supply. The USSR and mainland China increased their purchases while delays in the arrival of Indonesian rubber led to an unusually large amount of covering in west European countries. Supplies were lowered by particularly severe and early wintering of trees in Malaysia. It has been stated that demand increased to such an extent that all the stocks held in Malaysia as a result of the government purchasing scheme were absorbed and that, finally, a profit was made on the resale.

To summarize, the main groups of factors causing the severe decline in the price of natural rubber in recent years were as follows:

a. Overproduction in Malaysia as estates were replanted with high-yielding clones plus the addition to supplies following the re-entry of Indonesian rubber on to world markets.
b. Heavy releases from United States government stockpiles.
c. The tendency of the centrally-planned countries, particularly the USSR and mainland China, to buy rather spasmodically.
d. The lower levels of economic activity in most developed countries.
e. Competition from synthetic rubber.

Synthetic rubber is currently in plentiful supply as a result of the world oil glut and, for the uses in which it is competitive, provides a low long-term price ceiling for natural rubber. Natural rubber can remain competitive only by lowering production costs and there is some evidence that efficient producers are able to get costs down to an average of 9d or 10d a pound as the result of replanting with higher yielding trees. Yields an acre are rising rapidly with the national average in Malaysia of 950 lb—more than double that of 1951. Yields of 1,200 to 1,500 lb of rubber per acre a year are regularly returned and some experimental stands have yielded 3,500 lb an acre. It is not yet known to what extent reductions in costs resulting from increased productivity will be offset by rising wages and other direct costs.

In the long run the price ceiling will most probably be the price of *cis*-polyisoprene since this synthetic rubber appears to present the greatest long-term threat to natural rubber. No decreases in the price of this synthetic rubber are expected in the immediate future[1] but are very likely to occur in the long-term as a result of technological development and the economies of scale derived from increased production. In Malaysia it is believed that while orderly marketing of both natural and synthetic rubbers might prevent price declines such as that of recent years, in the long run the price trend of natural rubber will not be favourable to producers.[2]

The size of the US stockpile is still considered in many quarters to be a threat to the market and the US/GSA decision, early in 1969, to stop sales from the stockpile is regarded merely as a temporary palliative, albeit a welcome one.

## FUTURE PROSPECTS

It has been forecast[3] that world supplies of natural and synthetic rubber could increase by between 8 and 9 per cent in 1968.

It is believed that natural rubber production could increase by around 3 per cent. The increase in supplies of natural rubber are expected despite reductions in US stockpile releases and the fact that Indonesian production will most

(1) *FAO Commodity Review*, 1967

(2) Deputy Prime Minister, Tun Abdul Razak—reported in *The Public Ledger* 24.2.68

(3) *FAO Commodity Review*, 1968

probably be less than the very high levels reported in 1967. There seems every likelihood that world production will continue to increase into the 1970's. Replanting with high-yielding material continues apace in many countries and substantial increases in world supplies of natural rubber are to be expected when these trees attain productive age. High yield trees take about 12 years to reach maturity. A significant proportion of the newly planted material has not yet reached maturity and it has been calculated that in Malaysia, for instance, even without further planting production could increase by up to 400,000 tons per annum by 1970.

Replanting in Ceylon is encouraged by a Rubber Replacement Subsidy but the rate of replanting has fallen in recent years. None the less production is expected to increase by a further 50,000 tons per annum when the high-yielding replants mature. Similar development plans and subsidies are in operation in Ghana, India, Liberia, Nigeria and Thailand.

The supply of synthetic rubber could increase by up to 10 per cent in 1968[1] if the centrally-planned countries, particularly the USSR, continue their recent rates of expansion. New plants coming on stream in the United States should increase US production by more than 200,000 tons. Substantial production increases are also expected in Japan and France.

Other countries planning to start production of synthetic rubber by 1970 include Algeria, Egypt, Israel and Venezuela.

It is expected that total demand for elastomers will increase more rapidly in 1968 than in 1967 but that the demand for synthetic rubber will continue to increase at a greater rate than that for natural rubber. Thus, although the demand for natural rubber is expected to increase, its share of the total elastomer market will continue to fall.

It is expected that the demand for tyres and tyre products and hence the demand for rubber will expand in the United States, Japan, Italy and the German Federal Republic. Tyre usage could increase in the United Kingdom following the Tyre Regulations issued on 1st April 1968 which will most probably lead to more frequent discarding of old tyres. The USSR plans to increase production of passenger cars by 10 per cent per annum until 1970. It is expected, however, that the increase in Soviet demand for elastomers will be met to an increasing extent with synthetic rubber.

It is also expected that the quantity of natural rubber used in automobile tyres will increase with the increasing adoption of radial-ply tyres, which use more natural rubber per tyre than the older type of tyres, and as a result of the development of the cheaper oil-extended natural rubber.

The International Rubber Study Group, meeting in Lagos in 1966, forecast that by 1970 the production of natural rubber would exceed consumption by 15,000 tons and that in 1971 production could exceed consumption by 170,000 tons. It seems likely, therefore, that stocks will accumulate in producing countries.

Accumulating stocks of natural rubber and increasing production of synthetic rubber mean that the price of natural rubber is unlikely to increase significantly in the future. However, the demand for natural rubber is expected to increase, albeit less than the demand for synthetic rubber. It is therefore of prime importance that costs of production be reduced, mainly by increased productivity, and that natural rubber should be presented in a form which increases its competitiveness with synthetic rubber. This need for competitiveness appears to have been recognized, at least by Malaysia, and steps are being taken to bring it about.

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(1) *FAO Commodity Review*, 1968

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# Appendix

INTERNATIONAL DESCRIPTIONS OF THE GRADES OF RIBBED SMOKED SHEET RUBBER

Wet, bleached, under-cured and virgin rubber and rubber that is not completely visually dry at the time of buyers' inspection is not acceptable. (Except slightly under-cured rubber as specified for No. 5 and No. 6 RSS.)

Skim rubber made of skim latex shall not be used in whole or in part in the production of any grade.

Nothing but coagulated rubber sheets, properly dried and smoked, can be used in making these grades; block, cuttings or other scrap or frothy sheets, weak, heated or burnt sheets, air dried or smooth sheets not permissible.

### No. IX RSS

The grade must be produced under conditions where all processes are carefully and uniformly controlled.

Each bale must be packed free of mould but very slight traces of dry mould on wrappers or bale surfaces adjacent to wrapper found at time of delivery will not be objected to provided there is no penetration of mould inside the bale.

Oxidized spots or streaks, weak, heated, under-cured, over-smoked, opaque and burnt sheets are not permissible.

The rubber must be dry, clean, strong, sound and evenly smoked, and free from blemishes, specks, resinous matter (rust), blisters, sand, dirty packing and any other foreign matter. Small pinhead bubbles, if scattered, will not be objected to.

No Official International Sample has been established for this grade.

### No. 1 RSS

Each bale must be packed free of mould but very slight traces of dry mould on wrappers or bale surfaces adjacent to wrapper found at time of delivery will not be objected to provided there is no penetration of mould inside the bale.

Oxidized spots or streaks, weak, heated, under-cured, over-smoked, opaque and burnt sheets are not permissible.

The rubber must be dry, clean, strong, sound and free from blemishes, resinous matter (rust), blisters, sand, dirty packing and any other foreign

matter except slight specks as shown in sample. Small pinhead bubbles, if scattered, will not be objected to.

### No. 2 RSS

Slight resinous matter (rust) and slight amounts of dry mould on wrappers, bale surfaces and interior sheets, found at time of delivery will not be objected to, provided these conditions, either singly or in combination, do not exist to an objectionable extent on and in more than 5% of the number of bales included in the delivery, lot or tender as determined by the number of bales inspected.

Small bubbles and slight specks of bark, if scattered, will not be objected to.

Oxidized spots or streaks, weak, heated, under-cured, over-smoked, opaque and burnt sheets are not permissible.

The rubber must be dry, clean, strong, sound and free from blemishes, blisters, sand, dirty packing and all other foreign matter other than specified above as permissible.

### No. 3 RSS

Resinous matter (rust) and dry mould on wrappers, bale surfaces and interior sheets, found at time of delivery will not be objected to, provided these conditions, either singly or in combination, do not exist to an objectionable extent on and in more than 10% of the number of bales included in the delivery, lot or tender as determined by the number of bales inspected.

Slight blemishes in colour, small bubbles and small specks of bark permissible.

Oxidized spots or streaks, weak, heated, under-cured, over-smoked, opaque and burnt sheets are not permissible.

The rubber must be dry, strong and free of blemishes, blisters, sand, dirty packing and all other foreign matter other than specified above as permissible.

### No. 4 RSS

Resinous matter (rust), dry mould on wrappers, bale surfaces and interior sheets, found at time of delivery will not be objected to provided these conditions, either singly or in combination, do not exist to an objectionable extent on or in more than 20% of the number of bales included in the delivery, lot or tender as determined by the number of bales inspected.

Medium size bark particles, bubbles, translucent stains, slightly sticky and slightly over-smoked rubber are permissible to the extent shown in the sample.

Oxidized spots or streaks, weak, heated, under-cured, over-smoked (in excess of the degree shown in the sample), opaque and burnt sheets are not permissible.

The rubber must be dry, firm and free of blemishes, blisters, sand, dirty packing and all other foreign matter other than specified above as permissible.

### No. 5 RSS

Resinous matter (rust), dry mould on wrappers, bale surfaces and interior sheets, found at time of delivery will not be objected to provided these

conditions, either singly or in combination, do not exist to an objectionable extent on or in more than 30% of the number of bales included in the delivery, lot or tender as determined by the number of bales inspected.

Large bark particles, bubbles and small blisters, stains, over-smoked, slightly sticky rubber, and blemishes are permissible of the amount and size shown in the sample. Slightly under-cured rubber permissible.

Weak, heated, burnt, oxidized spots or streaks NOT permissible.

The rubber must be dry, firm, free of blisters, except to the extent shown in the sample, dirty packing, sand, and all other foreign matter other than specified above as permissible.

**No. 6 RSS**

Resinous matter (rust), dry mould on wrappers, bale surfaces and interior sheets, found at time of delivery will not be objected to provided these conditions, either singly or in combination, do not exist to an objectionable extent on or in more than 35% of the number of bales included in the delivery, lot or tender as determined by the number of bales inspected.

Extra large bark particles, bubbles and blisters, stains, over-smoked, slightly sticky rubber, blemishes, slightly oxidized spots or streaks are permissible of the amount and size shown in the sample. Slightly under-cured rubber permissible.

Weak, heated, or burnt sheets not permissible.

The rubber must be dry, firm, free of dirty packing, sand and all other foreign matter other than specified above as permissible.

## GLOSSARY OF TERMS

1 *Bark specks or particles*

Literally it is the external covering of the woody stems, branches and roots of plants but in rubber it includes all foreign matter of organic origin.

2 *Blemishes*

Any defects, stains or disfigurements not elsewhere classified except for slight milling disfigurements on Ribbed Smoked Sheets.

3 *Blister*

A sac, pit, pocket or depression on or in a sheet of rubber resulting from decomposition and gas formation during the processing operations. The inner surfaces of blisters are frequently sticky.

4 *Bubbles*

Small round globules of air or gas within the rubber formed during the coagulation process by trapped air or slight fermentation. The surfaces inside a bubble are usually dry and are not sticky.

5 *Bleached rubber*

See Virgin Rubber.

6 *Burnt sheets*

Rubber which has been charred as a result of too close contact to smoke fires, resulting in black oxidized condition.

7 *Clean*

This term when used in grade descriptions refers to a determination made by visual inspection and comparison to the pertinent sample.

8 *Dirty packing*

Any foreign matter such as grass, reeds, rattan slivers, paper, pieces of cloth, wood splinters or any other foreign matter not listed under the specifications as permissible.

9 *Dry rubber*

The complete absence of any evidence of moisture as determined by visual inspection. (See also Bleached, Under-cured and Virgin Rubber.)

10 *Firm rubber*

Rubber which is uniformly strong and solid as contrasted to rubber which is weak and spongy.

11 *Foreign matter*

Any material whatsoever other than rubber hydrocarbon and the natural substances inherent in rubber latex.

12 *Frothy sheets*

Sheets containing excess bubbles or blisters to the extent that the entire sheet shows nothing but this condition, caused by excess fermentation during the coagulation process. These sheets are soft and deteriorated as a result of poor preparation.

13 *Heated rubber*

Soft sticky spots or streaks appearing in the rubber, regardless of cause.

14 *Opaque sheets*

A black, opaque condition on the surface sheets (principally 4, 5 and 6 RSS) with evidence of oxidation.

15 *Over-smoked rubber*

Rubber which has been smoked so heavily as to have become almost opaque. This description does not include rubber which has been slightly charred as a result of too close contact to smoke fires.

16 *Oxidized rubber*

Rubber hydrocarbon, any of its serum constituents, or any foreign matter within the rubber which has combined with oxygen to deteriorate or degrade the rubber.

17 *Resinous matter* (*rust*)

Non-rubber, brownish deposit or film occurring on the surface of smoked sheets and is sometimes not apparent until the sheet is stretched or scratched.

18 *Sand*

The more or less fine debris of rocks, consisting of small, loose grains, often of quartz.

19 *Skim latex*

The residual liquid, of very low dry weight rubber content, being the by-product of the concentration of normal liquid latex.

20 *Sound rubber*

Free from any defect or weakness.

21 *Sticky rubber*

Tacky, viscous or gluey rubber.

22 *Strong rubber*

Property of resisting strain or tension.

23 *Under-cured rubber*

Portions of rubber which have not been thoroughly dried during the smoking or drying processes.

24 *Weak rubber*

(Sometimes known as 'short' rubber.) Ribbed Smoked Sheet which tears easily or breaks on application of sudden tension.

25 *Virgin rubber*

Rubber which still retains enough of the original moisture present as to present a whitish appearance as contrasted to 'bleached rubber' which is rubber which has become wet and has absorbed excess moisture.

**Source:** *International Standards of Quality and Packing for Natural Rubber Grades (The Green Book)* Effective from 1st July 1962, Published by The Rubber Manufacturers Association, Inc. (USA).

## STANDARD MALAYSIAN RUBBER

### Specifications

1 Standard Malaysian Rubber (SMR) is natural rubber supplied from the States of Malaya and such other parts of Malaysia as may be approved.

2 SMR is packed in compressed block form in bales not exceeding 112 lb preferably in 70 lb bales of dimensions 28" x 14". It is wrapped in polyethylene sheet or other approved material. It is free of any other bale coating.

3 SMR is graded by technical specifications, not by the conventional visual standards given in the 'Green Book' of the Rubber Quality and Packing Conference.

4 The maximum limits for the non-rubber constituents of the three SMR grades are:

| | | SMR-5 | SMR-20 | SMR-50 |
|---|---|---|---|---|
| Dirt | (%) | 0·05 | 0·20 | 0·50 |
| Ash | (%) | 0·5 | 1·0 | 1·5 |
| Copper | (ppm) | 8 | 8 | 8 |
| Manganese | (ppm) | 10 | 10 | 20 |
| Nitrogen | (%) | 0·7 | 0·7 | 0·7 |
| Volatile Matter | (%) | 1·0 | 1·0 | 1·0 |

5 Three levels of PRI denoted by H, M and S are marked on the bales inside the registered symbol and have the following significance.

H—PRI not less than 80
M—PRI not less than 60
S—PRI not less than 40

(At present this is not a guarantee mark and while every effort will be made to see that the large majority of bales will satisfy the requirements, no claims can be made on the basis of PRI.)

6 While colour forms no part of this technical specification, light coloured rubbers satisfying the RRIM colour standards and falling within the SMR 5 grade only may be specifically designated as SMR 5L. Rubbers prepared directly from latex by some of the new processes and by processes similar or equivalent to that now used for producing pale ADS will normally meet this colour standard; other rubbers will normally not do so.

7 Suppliers of SMR of any quality are required to register with the Malayan Rubber Export Registration Board and with the RRIM. For registration and use of the symbol

(i) typical samples of proposed SMR must be submitted;
(ii) the SMR specification which these intend to meet must be stated: (SMR 5L, SMR 5, SMR 20 or SMR 50);
(iii) the RRIM will then determine and specify the quality standard to which the samples conform and, when so requested, whether the 5L standard is satisfied;

(iv) arrangements for quality testing and control must be approved by the RRIM;

(v) baling and packing procedures must be stated.

8 Bales of SMR must be marked with the registration SMR symbol, the authorised grade, and the producer's code letters: the preparation type (*e.g.* pale crepe, sheet, compacted granules, brown crepe) and weight must also be shown. Advice notices must be similarly explicit.

9 SMR will be assessed only on the standards stated above and not by conventional International Type Grading. Complaints and disciplinary action will be considered by the Malayan Rubber Export Registration Board, with technical advice from the RRIM, on this basis alone.

10 The RRIM in consultation with Malayan Rubber Export Registration Board, reserves the right to amend these specifications after due notice has been given.

**Source:** *Standard Malaysian Rubber, 3,* Rubber Research Institute of Malaya, Chemical Division, April 1966.

## Notes

Copper and manganese content are included in the specifications as a measure of the ageing properties of the rubber, that is the resistance to oxidative breakdown. The Plasticity Retention Index (PRI) has been developed as a more positive means of assessing ageing. PRI is at present only associated with the SMR scheme but it is intended that it will eventually replace the trace metal measurements and be acceptable as a single sufficient criterion of resistance to oxidative breakdown.

The PRI is the percentage of the viscosity of a sample of raw rubber which is retained after artificial ageing. The ageing is carried out by heating the sample for 30 minutes at 140°C. The viscosity measurements are made in a Wallace Rapid Plastimeter.

$$\text{PRI} = \frac{\text{Viscosity after ageing}}{\text{Viscosity before ageing}} \times 100.$$

# Statistical Appendix

**Table A1**
**Natural Rubber**
**Production in principal producing countries**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | '000 tons | 1,958 | 1,990 | 2,095 | 2,130 | 2,068 | 2,238 | 2,343 | 2,400 |
| of which in: | | | | | | | | | |
| Malaysia (a) | | 715 | 780 | 808 | 817 | 855 | 893 | 936 | 988 |
| Ceylon | | 96 | 97 | 96 | 102 | 103 | 110 | 116 | 129 |
| India | | 23 | 25 | 27 | 31 | 37 | 44 | 49 | 52 |
| Brunei | | 1 | 2 | 2 | 2 | 1 | 1 | 1(c) | 1(c) |
| Papua | | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6(c) |
| Nigeria | | 40 | 59 | 55 | 59 | 63 | 71 | 68 | 76(c) |
| Indonesia | | 697 | 610 | 671 | 671 | 573 | 638 | 706 | 700(c) |
| Thailand | | 142 | 168 | 183 | 192 | 187 | 218 | 213 | 204 |
| Vietnam | | 70 | 75 | 78 | 74 | 71 | 73 | 60 | 48 |
| Cambodia | | 31 | 37 | 39 | 41 | 40 | 45 | 48 | 51 |
| Cameroun | | 4 | 4 | 5 | 4 | 4 | 5 | 6(c) | 6(c) |
| Burma (b) | | 12 | 9 | 10 | 11 | 9 | 9 | 9 | 9(c) |
| Congo (Kinshasa) | | 35 | 35 | 37 | 37 | 37 | 34 | 21 | 27(c) |
| Liberia (b) | | 40 | 48 | 41 | 45 | 41 | 42 | 48 | 52(c) |
| Brazil | | 22 | 23 | 22 | 21 | 20 | 28 | 29 | 24 |
| Other Countries | | 26 | 14 | 17 | 19 | 22 | 22 | 28 | 27 |

(a) West Malaysia, Singapore, Sabah, Sarawak
(b) Exports
(c) Estimates
**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, No. 11, 1967

**Table A2**
**Synthetic Rubber**
**Production in principal producing countries**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | '000 tons | 1,367 | 1,984 | 2,094 | 2,361 | 2,567 | 2,952 | 3,173 | 3,500 |
| of which in: | | | | | | | | | |
| United Kingdom | | 14 | 90 | 106 | 117 | 125 | 153 | 172 | 191 |
| Canada | | 119 | 160 | 164 | 168 | 179 | 197 | 203 | 200 |
| Australia | | — | — | 3 | 14 | 17 | 18 | 21 | 20 |
| India | | — | — | — | — | 7 | 12 | 15 | 15 |
| United States | | 1,121 | 1,436 | 1,404 | 1,574 | 1,608 | 1,765 | 1,813 | 1,970 |
| France | | 1 | 17 | 40 | 63 | 97 | 128 | 146 | 161 |
| Italy | | 13 | 66 | 82 | 86 | 95 | 110 | 118 | 120(a) |
| Netherlands | | — | 12 | 40 | 45 | 85 | 90 | 100 | 110 |
| German Federal Republic | | 21 | 80 | 86 | 88 | 106 | 136 | 161 | 182 |
| Belgium | | — | — | — | — | — | 15 | 20 | 20(a) |
| German Democratic Republic | | 77 | 85 | 88 | 89 | 88 | 92 | 93 | 100 |
| Poland | | 1 | 20 | 31 | 33 | 35 | 39 | 39 | 37 |
| Rumania | | — | — | — | — | 6 | 19 | 30 | 35 |
| Czechoslovakia | | — | — | — | — | — | 20 | 30 | 30(a) |
| South Africa | | — | — | — | — | — | 6 | 15 | 18 |
| Japan | | — | 18 | 50 | 68 | 90 | 120 | 159 | 228 |
| Brazil | | — | — | — | 16 | 29 | 32 | 35 | 53 |
| Argentina | | — | — | — | — | — | — | 3 | 10 |

(a) Estimated
**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A3**
**Natural Rubber**
**Consumption**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| In: | | | | | | | | | |
| United Kingdom | '000 tons | 201 | 181 | 168 | 164 | 169 | 181 | 184 | 181 |
| Canada | | 42 | 35 | 32 | 35 | 36 | 40 | 43 | 47 |
| Australia | | 39 | 37 | 29 | 33 | 36 | 38 | 36 | 34 |
| India | | 32 | 45 | 48 | 51 | 59 | 59 | 64 | 66 |
| United States | | 555 | 479 | 427 | 463 | 457 | 482 | 515 | 550 |
| German Federal Republic | | 138 | 146 | 136 | 146 | 150 | 153 | 155 | 155 |
| France | | 135 | 127 | 127 | 125 | 125 | 125 | 121 | 122 |
| Italy | | 56 | 74 | 79 | 79 | 87 | 81 | 86(a) | 90(a) |
| Sweden (b) | | 20 | 22 | 20 | 22 | 23 | 23 | 25 | 22 |
| Belgium (b) | | 17 | 15 | 15 | 14 | 16 | 17 | 17 | 18 |
| Netherlands | | 20 | 21 | 21 | 20 | 20 | 22 | 21 | 20 |
| South Africa (b) | | 23 | 19 | 17 | 18 | 21 | 30 | 29 | 21 |
| Brazil | | 40 | 44 | 39 | 40 | 36 | 32 | 26 | 30 |
| Argentina (b) | | 28 | 22 | 33 | 22 | 19 | 29 | 28 | 23(a) |
| Japan | | 123 | 166 | 176 | 190 | 192 | 203 | 198 | 213 |
| China (a) | | 77 | 120 | 83 | 107 | 108 | 142 | 135 | 167 |
| Czechoslovakia (b) | | 40 | 62 | 64 | 27 | 52 | 45 | 45 | 34(a) |
| Rumania (b) | | 6(c) | 9 | 11 | 14 | 19 | 22 | 19 | 24 |
| Poland (b) | | 27 | 32 | 35 | 36 | 32 | 39 | 35 | 41 |
| German Democratic Republic (b) | | 13 | 23 | 24 | 23 | 24 | 30 | 28 | 29 |
| USSR (b) | | 140 | 170 | 330 | 330 | 270 | 160 | 240 | 276(a) |

(a) Estimated
(b) Net imports
(c) Average, 1958–59 only
**Source:** *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A4**
**Synthetic Rubber**
**Consumption**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| In: | | | | | | | | | |
| UK | '000 tons | 53 | 116 | 121 | 133 | 144 | 166 | 180 | 190 |
| Canada | | 48 | 56 | 63 | 73 | 84 | 91 | 96 | 107 |
| Australia | | 12 | 25 | 23 | 25 | 33 | 35 | 37 | 36 |
| India | | 3 | 6 | 9 | 10 | 11 | 14 | 20 | 22 |
| US | | 930 | 1,079 | 1,102 | 1,256 | 1,307 | 1,452 | 1,541 | 1,672 |
| German Federal Republic | | 47 | 104 | 120 | 129 | 143 | 174 | 205 | 209 |
| France | | 44 | 91 | 96 | 108 | 123 | 139 | 145 | 165 |
| Netherlands | | 5 | 12 | 13 | 14 | 15 | 18 | 20 | 23 |
| Italy | | 22 | 57 | 64 | 72 | 91(a) | 95(a) | 111(a) | 127(a) |
| Belgium(b) | | 7 | 12 | 14 | 16 | 19 | 22 | 25 | 26 |
| South Africa(c) | | 11 | 15 | 15 | 17 | 18 | 26 | 22 | 22 |
| Sweden(b) | | 7 | 16 | 16 | 20 | 21 | 26 | 32 | 34 |
| Japan | | 15 | 61 | 84 | 104 | 126 | 160 | 173 | 219 |
| Brazil | | 3 | 16 | 20 | 29 | 34 | 40 | 37 | 51 |
| Argentina(b) | | 5 | 12 | 18 | 17 | 15 | 29 | 37 | 38(a) |
| Czechoslovakia(a/c) | | 14 | 20 | 23 | 22 | 22 | 40 | 45 | 47(a) |
| Rumania(c) | | 7(d) | 9 | 12 | 12 | 21 | 18 | 24 | 29 |
| Poland(c) | | 13 | 25 | 30 | 39 | 43 | 50 | 52 | 59 |
| German Democratic Republic(c) | | 35 | 37 | 46 | 44 | 47 | 50 | 52 | 61 |
| USSR(a) | | 260 | 350 | 260 | 310 | 430 | 600 | 580 | 610 |
| China(a) | | 1 | 16 | 14 | — | — | — | 1 | 6 |

(a) Estimated
(b) Net Imports
(c) Production + Net Imports
(d) Average, 1958–59 only
**Source:** *Plantation Crops*. Commonwealth Secretariat, 1967, No. 11

**Table A5**
**Natural Rubber**
**Exports**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | '000 tons | 1,891 | 1,958(b) | 2,077 | 2,075 | 2,016 | 2,126 | 2,250 | 2,277 |
| of which from: | | | | | | | | | |
| Malaysia(d) | | 749 | 839 | 861 | 856 | 908 | 914 | 951 | 997(e) |
| Brunei | | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| Papua | | 4 | 4 | 4 | 5 | 5 | 5 | 6 | 6 |
| Ceylon | | 92 | 105 | 88 | 100 | 94 | 113 | 119 | 133 |
| Nigeria(c) | | 41 | 57 | 55 | 60 | 63 | 72 | 67 | 70 |
| Indonesia(a) | | 679 | 577 | 667 | 650 | 552 | 617 | 684 | 677 |
| Thailand | | 141 | 167 | 182 | 191 | 184 | 213 | 208 | 199 |
| South Vietnam | | 67 | 69 | 82 | 73 | 68 | 70 | 56 | 43 |
| Cambodia | | 30 | 40 | 39 | 36 | 42 | 24 | 68 | 50 |
| Burma | | 12 | 10 | 10 | 11 | 11 | 9 | 8 | 7(a) |
| Liberia | | 41 | 48 | 41 | 45 | 41 | 42 | 48 | 52 |
| Congo (Kinshasa) | | 33 | 35 | 37 | 37 | 37 | 34 | 21 | 27(a) |
| Cameroun(c) | | 3 | 4 | 9 | 8 | 9 | 9 | 10 | 10 |
| Ivory Coast | | — | — | — | — | — | 2 | 3 | 5 |

(a) Estimates—RSG; figures for Indonesia include non-reported shipments
(b) Including Ghana, 1
(c) Shipments from W. Cameroun included with Nigeria until September, 1960; then with Cameroun
(d) Includes W. Malaysia, Sabah and Sarawak
(e) Of which Sarawak—34,000 tons and Sabah—24,000 tons
**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A6**
**Synthetic Rubber**
**Exports**

| | | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | '000 tons | 347 | 634 | 625 | 667 | 722 | 857 | 891 | 921(b) |
| of which from: | | | | | | | | | |
| UK | | 1 | 20 | 21 | 28 | 35 | 42 | 51 | 58 |
| Canada | | 83 | 108 | 117 | 113 | 118 | 136 | 129 | 130(a) |
| US | | 186 | 345 | 297 | 304 | 283 | 321 | 282 | 309 |
| Belgium | | — | — | — | — | — | 15(a) | 20(a) | 20(a) |
| France | | — | 7 | 10 | 24 | 41 | 57 | 73 | 80 |
| Netherlands | | — | 7 | 22 | 40 | 61 | 78 | 92 | 108 |
| Italy | | 5 | 36 | 45 | 41 | 52 | 54 | 60 | 42 |
| German Federal Republic | | 4 | 21 | 18 | 24 | 39 | 44 | 53 | 59 |
| German Democratic Republic | | 43 | 49 | 43 | 45 | 41 | 42 | 41 | 39 |
| Poland | | — | 9 | 10 | 10 | 7 | 5 | 4 | 2 |
| Rumania | | — | — | — | — | 1 | 6 | 11 | 13 |
| Brazil | | — | — | — | — | 1 | 5 | 7 | 10 |
| South Africa | | — | — | — | — | — | — | 1 | 2 |
| Japan | | — | 1 | 5 | 6 | 8 | 16 | 30 | 49 |
| USSR | | 25(a) | 31 | 37 | 32 | 35 | 36 | 37 | n.a. |

n.a.: Not available
(a) Partially estimated
(b) Total incomplete
**Source:** Derived from *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

Table A7
Natural Rubber
Imports

| Into: | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|
| UK '000 tons | 277 | 210 | 272 | 231 | 199 | 198 | 196 | 184 |
| Canada | 44 | 35 | 32 | 37 | 38 | 43 | 45 | 50 |
| Australia | 38 | 37 | 28 | 34 | 37 | 39 | 38 | 31 |
| India | 9 | 21 | 24 | 26 | 26 | 20 | 16 | 15 |
| German Federal Republic | 140 | 152 | 135 | 141 | 150 | 164 | 168 | 161 |
| France | 135 | 130 | 124 | 121 | 125 | 125 | 119 | 127 |
| Italy | 57 | 68 | 78 | 79 | 87 | 88 | 82 | 85 |
| Netherlands | 19 | 21 | 22 | 21 | 21 | 21 | 22 | 23 |
| Belgium | 20 | 18 | 18 | 16 | 18 | 19 | 18 | 19 |
| Sweden | 20 | 23 | 21 | 24 | 24 | 25 | 29 | 27 |
| Austria(a) | 11 | 11 | 11 | 11 | 11 | 12 | 13 | 12 |
| Spain | 21 | 22 | 23 | 24 | 33 | 34 | 36 | 41 |
| Yugoslavia | 8 | 13 | 15 | 15 | 16 | 18 | 18 | 17 |
| Poland | 27 | 32 | 35 | 36 | 33 | 39 | 35 | 41 |
| Czechoslovakia | 40 | 62 | 64 | 27 | 52 | 45 | 45 | n.a. |
| Hungary | 8 | 10 | 12 | 13 | 14 | 15 | 15 | 17 |
| German Democratic Republic | 13 | 23 | 24 | 23 | 24 | 30 | 28 | 29 |
| Rumania | 6(d) | 9 | 11 | 14 | 19 | 22 | 19 | 25 |
| USSR | 162 | 188 | 355 | 356 | 294 | 183 | 267 | n.a. |
| US | 564 | 411 | 391 | 422 | 380 | 441 | 435 | 432 |
| Mexico | 15(b, d) | 15 | 13 | 13 | 14 | 16 | 18 | 18 |
| Brazil | 15 | 14 | 13 | 10 | 20 | 8 | 3 | 6 |
| Argentina | 28 | 22 | 33 | 22 | 19 | 29 | 28 | 22 |
| South Africa | 23 | 19 | 17 | 18 | 21 | 30 | 27 | 21 |
| Japan | 124 | 170 | 183 | 190 | 185 | 212 | 207 | 226 |
| China(c) | 107 | 113 | 89 | 93 | 117 | 138 | 146 | 167 |

n.a. : not available
(a) Includes some gutta-percha and balata
(b) Includes synthetic latex, Canada 1955–56 only
(c) From returns of exporting countries
(d) Average 1958–59 only
**Source:** *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A8**
**Synthetic Rubber**
**Imports**

| Into: | Average 1955–59 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|
| UK '000 tons | 44 | 57 | 41 | 51 | 53 | 58 | 54 | 61 |
| Canada | 15 | 18 | 19 | 26 | 24 | 27 | 30 | 41 |
| Australia | 13 | 27 | 14 | 16 | 15 | 16 | 17 | 16 |
| India | 3 | 9 | 9 | 11 | 9 | 4 | 4 | 4 |
| France | 47 | 94 | 70 | 67 | 73 | 76 | 78 | 97 |
| German Federal Republic | 32 | 49 | 51 | 63 | 77 | 84 | 97 | 90 |
| Italy | 17 | 34 | 33 | 35 | 41 | 46 | 53 | 69 |
| Belgium | 7 | 13 | 14 | 16 | 20 | 22 | 24 | 26 |
| Netherlands | 5 | 12 | 10 | 10 | 10 | 14 | 16 | 18 |
| Sweden | 8 | 15 | 17 | 20 | 21 | 27 | 31 | 35 |
| Spain | 2 | 9 | 13 | 17 | 22 | 28 | 34 | 49 |
| Austria | 4 | 8 | 8 | 12 | 12 | 14 | 15 | 18 |
| Czechoslovakia | 14 | 20 | 23(a) | 22(a) | 22(a) | 20(a) | 15(a) | n.a. |
| Rumania | 7(b) | 9 | 12 | 12 | 17 | 5 | 5 | 7 |
| Poland | 12 | 14 | 9 | 16 | 15 | 16 | 17 | 24 |
| USSR | 27 | 36 | 55 | 37 | 39 | 44 | 53 | n.a. |
| US | 9 | 9 | 12 | 14 | 19 | 32 | 40 | 45 |
| Mexico | 14(b) | 18 | 22 | 24 | 25 | 32 | 30 | 35 |
| Brazil | 3 | 17 | 23 | 17 | 10 | 12 | 10 | 11 |
| Argentina | 4 | 12 | 19 | 17 | 15 | 29 | 37 | 9 |
| Venezuela | n.a. | 7 | 8 | 11 | 10 | 15 | 13 | 14 |
| Japan | 18 | 50 | 44 | 49 | 54 | 56 | 49 | 46 |
| South Africa | 11 | 15 | 15 | 17 | 18 | 20 | 8 | 6 |

n.a. : not available
(a) Exports from USSR, Poland and German Democratic Republic
(b) Average 1958–59 only
**Source:** *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A9**
**Natural Rubber**
**End of Year Stocks**

| | | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** (a, b) | '000 tons | 688 | 745 | 748 | 758 | 703 | 808 | 812 | 857 |
| of which in: | | | | | | | | | |
| West Malaysia | | 64 | 75 | 76 | 103 | 87 | 90 | 88 | 100 |
| Singapore | | 44 | 59 | 47 | 53 | 25 | 44 | 26 | 46 |
| Indonesia(c) | | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| Ceylon | | 24 | 16 | 23 | 24 | 32 | 26 | 19 | 23 |
| Vietnam | | 8 | 12 | 9 | 9 | 10 | 10 | 9 | 8 |
| Cambodia | | 5 | 6 | 6 | 6 | 5 | 6 | 7 | 6 |
| UK(b) | | 20 | 33 | 23 | 25 | 24 | 23 | 25 | 26 |
| US(b) | | 79 | 77 | 68 | 70 | 61 | 87 | 100 | 82 |
| Canada | | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 5 |
| Brazil | | 3 | 3 | 2 | 2 | 4 | 7 | 10 | 7 |
| Australia | | 3 | 3 | 2 | 4 | 5 | 6 | 7 | 5 |
| India | | 11 | 13 | 13 | 16 | 18 | 19 | 20 | 22 |
| France | | 9 | 15 | 10 | 7 | 13 | 13 | 11 | 14 |
| German Federal Republic | | 14 | 18 | 16 | 12 | 14 | 16 | 18 | 17 |
| Japan | | 14 | 16 | 22 | 22 | 15 | 21 | 25 | 38 |

(a) Estimated—include countries not shown and stocks afloat
(b) Excluded government stocks
(c) Little information available, a constant estimate of 75
**Source:** *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A10**
**Synthetic Rubber**
**End of Year Stocks**

| | | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** (a, b) | '000 tons | 335 | 407 | 435 | 465 | 522 | 577 | 615 | 677 |
| of which in: | | | | | | | | | |
| UK | | 10 | 16 | 18 | 21 | 24 | 29 | 29 | 25 |
| US(b) | | 211 | 249 | 256 | 262 | 283 | 297 | 312 | 348 |
| Canada | | 9 | 10 | 17 | 19 | 17 | 18 | 24 | 28 |
| France | | 9 | 18 | 30 | 18 | 27 | 34 | 42 | 55 |
| German Federal Republic | | 10 | 9 | 8 | 9 | 9 | 10 | 12 | 9 |
| Japan | | 10 | 17 | 22 | 28 | 38 | 34 | 39 | 46 |
| Australia | | 4 | 5 | 5 | 8 | 8 | 7 | 3 | 7 |
| India | | 1 | 3 | 3 | 3 | 10 | 11 | 7 | 8 |

(a) Estimated—Includes countries not shown and stocks afloat
(b) Excluding government stocks
**Source:** *Plantation Crops*, Commonwealth Secretariat, 1967, No. 11

**Table A11**
**Rubber**
**Prices in Selected Countries**

CFTRI LIBRARY MYSORE-2A

| Year and Month | | NATURAL | | | | | | | | | | | SYNTHETIC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Wholesale prices | | | | | | Export prices | | | Import prices | | Wholesale prices |
| | | Ceylon Rupees/100 lb. | Thailand Bahts/60 kg | UK Pence/lb. | US I Cents/lb. | II | III | Indonesia Rupiah/100 kg | Singapore I Cents/lb. | II | UK I Pence/lb. | II | US Cents/lb. |
| 1960 | | 123·7 | 756 | 32·2 | 38·2 | 37·6 | 34·9 | 4,070 | 108·1 | 104·9 | 30·6 | 28·6 | 23·9 |
| 1961 | | 100·4 | 560 | 24·8 | 29·5 | 29·2 | 26·3 | 3,480 | 83·5 | 81·8 | 24·0 | 20·3 | 23·9 |
| 1962 | | 97·8 | 508 | 23·3 | 28·6 | 27·9 | 26·6 | 9,182 | 78·2 | 75·8 | 22·4 | 20·5 | 23·6 |
| 1963 | | 92·7 | 473 | 21·8 | 26·3 | 25·6 | 24·4 | 19,621 | 72·4 | 70·6 | 20·9 | 19·3 | 23·0 |
| 1964 | | 89·5 | 454 | 20·6 | 25·2 | 24·9 | 22·3 | 37,990 | 68·1 | 67·2 | 19·8 | 18·3 | 23·0 |
| 1965 | | 91·4 | 476 | 21·2 | 25·7 | 25·2 | 19·2 | ... | 70·0 | 68·6 | 20·3 | 16·0 | 23·0 |
| 1966 | | 89·1 | 449 | 19·8 | 23·6 | 23·3 | 22·5 | ... | 65·4 | 63·8 | 19·1 | — | 23·0 |
| 1966 | iv | 90·4 | 470 | 20·0 | 24·5 | 24·3 | 23·2 | ... | 67·3 | 66·0 | 19·8 | — | 23·0 |
| | v | 91·5 | 464 | 21·1 | 24·2 | 24·0 | 24·3 | ... | 68·7 | 66·2 | 19·7 | — | 23·0 |
| | vi | 88·5 | 442 | 20·9 | 23·7 | 23·4 | 23·1 | ... | 65·7 | 63·2 | 18·8 | — | 23·0 |
| | vii | 88·7 | 444 | 20·0 | 23·5 | 23·2 | 22·5 | ... | 64·6 | 63·2 | 18·8 | — | 23·0 |
| | viii | 87·8 | 437 | 19·3 | 23·0 | 22·8 | 22·6 | ... | 63·6 | 62·1 | 18·6 | — | 23·0 |
| | ix | 84·6 | 413 | 18·1 | 22·2 | 21·8 | 21·4 | ... | 59·7 | 58·8 | 17·7 | — | 23·0 |
| | x | 88·0 | 430 | 19·1 | 22·0 | 21·6 | 21·2 | ... | 62·7 | 61·2 | 18·2 | — | 23·0 |
| | xi | 87·3 | 427 | 18·6 | 22·3 | 22·1 | 21·5 | ... | 62·7 | 61·4 | 18·3 | — | 23·0 |
| | xii | 85·3 | 412 | 18·4 | 22·0 | 21·8 | 21·2 | ... | 60·3 | 59·3 | 17·8 | — | 23·0 |
| 1967 | i | 84·5 | ... | 18·2 | 21·6 | 21·3 | 21·1 | ... | 59·2 | 58·2 | 17·6 | — | 23·0 |
| | ii | 81·2 | ... | 17·6 | 20·7 | 20·4 | 19·8 | ... | 56·8 | 55·8 | 16·9 | — | 23·0 |
| | iii | 81·1 | ... | 17·1 | 20·7 | 20·4 | 19·1 | ... | 56·7 | 55·5 | 16·7 | — | 23·0 |
| | iv | 81·9 | ... | 17·0 | 20·8 | 20·5 | 19·0 | ... | 57·1 | 55·3 | 16·7 | — | 23·0 |
| | v | 80·1 | ... | 17·1 | 20·7 | 20·4 | 18·4 | ... | 56·1 | 52·9 | 16·0 | — | 22·8 |
| | vi | 81·6 | ... | 19·0 | 21·8 | 21·2 | 18·8 | ... | 57·1 | 53·8 | 16·1 | — | 22·8 |
| | vii | 79·3 | ... | 18·2 | 20·6 | 20·0 | 18·8 | ... | 55·4 | 52·8 | 15·8 | — | 22·8 |
| | viii | ... | ... | 16·1 | 19·4 | 18·8 | 17·2 | ... | 52·0 | 49·6 | 15·1 | — | ... |
| | ix | ... | ... | ... | ... | ... | ... | ... | 50·7 | 47·5 | ... | | ... |
| | x | ... | ... | ... | ... | ... | ... | ... | 50·2 | 46·2 | ... | | ... |
| | xi | ... | ... | ... | ... | ... | ... | ... | 49·2 | 45·3 | ... | | ... |
| | xii | ... | ... | ... | ... | ... | ... | ... | 49·6 | 45·7 | ... | | ... |
| 1968 | i | | | | | | | | 48·2 | 44·9 | | | |
| | ii | | | | | | | | 45·4 | 43·5 | | | |
| | iii | | | | | | | | 49·4 | 45·1 | | | |
| | iv | | | | | | | | 49·8 | ... | | | |
| | v | | | | | | | | 51·4(p) | | | | |

(p) Provisional ... Data not available — Nil or negligible or no longer applicable

**Source:** Compiled from *FAO Monthly Bulletin of Agricultural Economics and Statistics,* 16 No. 11, November 1967, 17 No. 6, June 1968, 17 No. 7/8, July/August 1968

Types of rubber for which prices are listed:

**NATURAL RUBBER**

*Wholesale:* CEYLON, RSS1, wholesale price excluding export duty, Colombo
THAILAND, Para, wholesale price Bangkok
UK, RSS1, Spot, London
US, Wholesale price, New York, I RSS1, II RSS3, III No. 3 Blanket Crepe

*Export:* INDONESIA, Sheets No. 1, prices f.o.b. Jakarta
SINGAPORE, In bales, f.o.b., I RSS1, II RSS3

*Import:* UK, c.i.f. London, I RSS3, II C blankets

**SYNTHETIC RUBBER**

*Wholesale:* US, S-type cold, staining and non-staining Nos. 1500 and 1502, f.o.b. plant.